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Information Resources on Old World Camels: Arabian and Bactrian 2004-2009

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AWIC Resource Series No. 13, Revised 2010

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About this Document

This publication updates and revises "Information Resources on Old World Camels: Arabian and Bactrian 1941-2004" AWIC Resource Series No. 13 - December 2004 (http://www.nal.usda.gov/awic/pubs/Camels/camels2.htm).

There have been a number of decisions made regarding the topics that are included in this publication. In most cases, the topics are related to the whole animal: biology, behavior, nutrition, feeds, reproductive physiology and the birth process, breeding and genetics, diseases, disease organisms, zoonotic aspects of infectious diseases, external parasites, veterinary care, etc. Some camel-based products are addressed: milk, milk composition, microbiology and uses; some aspects of meat; and the value and use of hides and fiber. Economics of camels and camel-based products as well as their role in the lives of the nomadic people are also included. Organoleptic qualities of meat and dairy products are not included.

The information in this resource has been extracted from many sources. It is not a comprehensive listing of the world's literature available on these animals. The published sources are mostly journal articles, books, book chapters, conference papers, and reports. Abstracts are included when available and when permitted by the copyright holders. Some credible World Wide Web resources are also listed. Many references include the URL of the resource, the DOI numbers and the National Agricultural Library call number for journals in our holdings. For ease of requesting photocopies or interlibrary loans, see http://www.nal.usda.gov/services/request.shtml.

The bibliographic citation section is arranged in several topical areas, by publication year and alphabetically by author within each year. Since this is an electronic version, it does not include an index. It is expected that by searching using key words, the user will find what is of interest. Most of the information is in English. References include materials published from 1941 through 2008. The compiler welcomes additional information from other sources for inclusion or any comments or suggestions. It is desirable to have a comprehensive resource of information about these animals, and collaborators are welcome. If you have or know of science based information that would enhance this publication, please contact me. Note that any information submitted must have the important elements of identification and access i.e author, year, publication information, title, accessibility, etc.

The compiler welcomes additional information from other sources for inclusion as well as any comments or suggestions. It is desirable to have a comprehensive resource of information about these animals, and collaborators are also welcome. If you have or know of science-based information that would enhance this publication, please contact us. Note that any information submitted must include important elements of identification and access i.e. author, year, publication information, title, accessibility, etc.

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Readers are cautioned as to the dynamic nature of the internet and the fact that web addresses and content are subject to change. All sites are current as of April 2010.

Acknowledgements

Sandra Ball, Webmaster for the AWIC program, spent many hours editing converting the document into HTML. Her careful attention to detail helped greatly to provide a consistent, accurate and more readable document.

Introduction

The Camelidae family is a comparatively small family of mammalian animals. There are two members of Old World camels living in Africa and Asia--the Arabian and the Bactrian. There are four members of the New World camels of South America--llamas, vicunas, alpacas and guanacos. They are all very well adapted to their respective environments. The camels thrive in the harsh deserts of Africa and Asia and their South American cousins in the high altiplano and bush area. Most of these species have been integrated into and play very important roles in lives of the indigenous people. They have been traditionally used for transport of people and things, to supply hides and fibers for clothing, other textile articles, and meat and milk products. The animals have been used and bred for several thousand years, but the efforts to understand their biology and diseases in greater depth has been only been done fairly recently. Because camels are still such important animals in Africa, the Middle East and Asia, there has been more interest and need to understand their nutrition and health care requirements, reproduction, behavior, physiology, diseases, veterinary care and responses to new climates. This bibliography has been compiled to address these issues.

Taxonomy

Camels are in the taxonomic order Artiodactyla (even toed ungulates), sub order Tylopoda (pad-footed), and Family Camlidae. They are ruminants along with the giraffes, deer, cattle, sheep, goats and antelopes. They have several unique features: they walk on pads not hoofs, they do not have horns or antlers, and their red blood cells are oval in shape. They also have very high red blood cell counts. All the family members have great water efficiency, long necks, two toes, and well-padded feet. Finally, a camel's toes have a web connecting them.

The New World camels include two wild species in the high Andes of South America. They are the vicuna (*Lama vicugna*) and the guanaco (*Lama guanacoe*). The native people of the Andes domesticated the llama (*Lama glama*) and the alpaca (*Lama pacos*). There seems to be some controversy over the parent species of the alpaca and llama. The evidence suggests that both domestic species were derived from the guanaco. They all have long necks, but

no humps. They do have the ability to survive in harsh dry climates due to their ability to conserve their body water.

Taxonomy - Camelidae Family (see Mason, I.L 1979 for more taxonomic information and characteristics of these animals.) The Camelidae evolved in North America. Their ancestors migrated from North America across the Alaskan land bridge to Asia and down across Panama into South America. They eventually became extinct in North America, but adapted well and evolved to their current forms. At one time the camels ranged from Asia to Eastern Europe. After crossing into Africa, they were found across the northern area and as far south as northern Tanzania.

General Overview of the Characteristics of Old World Camels

The Old World camels fall basically into two species, the Arabian and the Bactrian. Linnaeus named the two species known as *Camelus dromedarius* and *Camelus bactrianus*. The Arabian camels have one hump on their backs and the Bactrian camels have two humps. Both camel species live in very dry, desert areas.

The Old World camels exhibit some interesting physiological and morphological characteristics that allow them to live in such dry environments. These include: long eye lashes that protect their eyes from sand, control of the opening and closing of their nostrils, and a body structure that allows the animals to stand high above the hot sand, allows for heat loss, and gives them an ability to reach tall forage. Also, the body temperature of the animal can fluctuate between 93 and 105 F which reduces water loss by sweating. Their ability to withstand water deprivation is truly remarkable and stems from several factors: they don't overheat and can withstand a high percentage of water loss and can metabolize stores of fats in their hump in times of food and water deprivation. In times of dehydration, the water seems to be lost from tissues, but not from blood. For this reason there is no circulatory distress and the animals can sustain a loss of up to 25% of their body weight. (Humans lose water from blood and tissue and will die of sluggish circulation at a loss of 12% of their body water.) Camels can also re-hydrate very quickly. As domesticated animals, they are considered rather bad-tempered, not very intelligent, and rather untrustworthy. They can deliver a nasty

bite as their adult teeth are similar to the fangs of a canine.

There are still Bactrian camels that exist in the deserts of north-west China and south-west Mongolia as wild animals, but their numbers—possibly 1000 are dwindling due to human encroachment and they are listed as critically endangered.

The Arabian camels no longer have wild relatives but exist as a domesticated species. It has been suggested that they are actually derived from the Bactrian camels and lost one of their humps in the process of domestication. Archeologists think that domestication took place in the middle or southern part of the Arabian Peninsula about 3,000 B.C. From there, they moved to other parts of the Middle East and eventually into North Africa. They are used as pack animals; for human transport; and as a source of wool, hides, meat and milk. Some are used for racing and wrestling competitions. Today, there are several breeds. The most popular and well known breed is the dromedary. The geographic range for Arabians is Northern Africa and the Middle East. The Arabian overlaps with the Bactrian camel in the areas of Afghanistan, Pakistan, and Southwest Asia.

Camels are large animals. Dromedaries can stand 6 feet at the shoulder and weigh about 1100 pounds. As pack animals, they can carry up to approximately 400 pounds. They have not changed much from their wild ancestors. They are a little larger and have larger humps. There are two general types of dromedaries: those selectively bred to be strong pack and draught animals; and those bred to be long legged riding and racing camels (such as the Mehari of the Sahara and the Mahri of Pakistan).

Today, camels are seldom transported to other countries other than for exhibit. It is interesting to note that in the past, dromedary camels have been introduced into countries far from their origins. Some of the more notable introductions have occurred in the last 200 years. They took place in Tuscany, Spain, Australia, the Canary Islands and South America. In the U.S., they were introduced in Virginia and in the desert areas of Arizona and Nevada.

Although there are environmental conditions in other parts of the world that can support these animals, the most successful introductions were in Australia. They were first imported to Australia from India by the British in 1860 and 1866, and became very important in the

development of the interior of the Australian outback. Camel trains carried supplies to the outback mining and ranching stations, and aided in the general exploration and construction of transcontinental telegraph lines and railroads. Soon after introduction of autos and trucks, the camel gradually became obsolete. At that time, many were simply turned loose and established feral herds which have greatly expanded in numbers. Although they do not eat the same foods as cattle and sheep, they are now considered to be "vermin" and there are efforts to try and control their numbers.

Current research on Bactrian Camels—domestic and wild

The Bactrian camels of Central Asia, China, and Mongolia are important to the indigenous people. They follow their herds of horses and other grazing animals. They are much heavier, used as pack and draught animals, and can withstand the very low temperatures of the winter and the high temperatures of the summer. They are also stocky, and much more hairy and wooly than the Arabian species. They are used as a source of milk and meat and their dried dung is used as fuel.

Numerous aspects of these important and economically valuable animals have been and continue to be studied. In the bibliography you will find many of the recent research papers.

An understanding of the mitrochrondial genome of the wild Bactrian and the dromedary shows there was a split between the species 25 million years ago when the roamed North America before they moved back to Asia.

The domesticated Bactrian camel is only beginning to be understood both from an economic and environmental point of view but also for its uniqueness in physiology and products.

There are issues of crossing the Arabian and the Bactrian. There is now a DNA-based test to identify parentage which will be useful in selection breeding stock.

There is information being gathered on the physical structure, anatomy, blood values, vascular systems, etc. between different domesticated Bactrian camels and between Bactrian and dromedary camels. For example Bactrian camels have physiological differences to allow

them to live in areas of high elevation and like some of the South American camelids, they can exist in lower oxygen levels and lower ambient temperatures.

They are uniquely adapted to deserts of China and Mongolia. There are several breeds that currently exist from those that were probably domesticated about 3,000 B.C. They have diverged from their wild cousins although they can interbreed. They depend on a variety of grasses, forbs, and shrubs in such fragile environments so management is critical for sustainability. Although domesticated Bactrian camels have decreased and their number in Mongolia may number about 240,000, their wild relatives are some of the most endangered of any animals on the planet with possibly only 1,000 animals remaining in the wild.

Since camels' milk is beginning to be recognized as a valuable commodity, there are movements in some countries to enhance their value as dairy animals. There are groups in Russia that are selecting high level milkers of both Bactrian and dromedary animals for their milk products. For example the Bactrian camel's milk can reach a level of 8% milk fat which is a very rich food for new born camels and or humans. There is research by Narmuratova, (2006) about the composition of the fatty acids of the milk. It is more valuable than cows' milk for its richness. Camels can also produce milk for up to 18 months in environments where cattle could not lactate for such a long time. At this time, there are no reliable estimates regarding milk production levels in the world. Faye (2005) states that the world estimate was 1.3 million tons in 2002 but the figure is thought to be possibly as high as 5.4 million tons.

There are advances in understanding into camel structure and anatomy, diseases and treatments, and embryo manipulation techniques for reproduction. Other research is on foraging and forage patterns, uses of animal products, and predation.

Advances seem to be in the structure and anatomy as well as diseases and treatments, foraging and the beginning of new techniques for embryo manipulation for reproduction. Other research is on forage patterns, uses of animal products and predation.

There are concerns about making sure that the Bactrian camel still has a role to play in the 21 century and beyond and hopefully this will be true.

The wild relatives of the domesticated Bactrian camel have been described as smaller, more slender bodies with lower pyramid-shaped humps. Their legs are more slender, long and lith. There are some small herds that roam the Kumtage desert of northern China, Gansu and Govi-altay in Mongolia. They are different enough that the domestic and the wild Bactrian do not interbreed easily. Rimutu Ji of Inner Mongolia Agricultural University in Huhhot, China and He Ming of Shanghai Jiao Tong University worked with scientists from the Chinese Acadeum of Science to test DNA from 3 wild Bactrian camel populations. The DNA data indicates that there was a common ancestor for the wild and the domestic strains, but that divergence happened around 700,000 years ago and the common ancestor does not exist. There is a discussion to consider the wild and the domestic Bactrian camels as subspecies.

Current research on the Arabian/dromedary camel.

Dromedaries are very important animals and there is a great deal of interest in these animals as the recent literature in the last four years in this document illustrates. Some of the new avenues of research are mentioned below. Wernery (2007 p. 200-204) states that "The camel is a multi-purpose animal with a huge productive potential. To western societies and even scientists it is unfortunately an alien animal. Only a few people have realized that the camel is the most suitable domestic animal for use in climatic extremes."

Most of the scientific research information is on physiology, anatomy and production. Veterinary care is becoming much more developed as there are a number of important diseases—bacterial, viral, protozoan and cestodal parasites that really negatively impact the health of camels.

Production systems. There are old and new approaches to camel production—the long established pastoral system and the new more intensive dairy and animal production systems. Breeding, pregnancy, raising neonates, and disease prevention are topics of research. Breed identification, characterization and genetics research is allowing for better selection of animals for dairy, draft, transport, racing, maintaining diversity, etc. The number of articles related to nutrition illustrates attempts to understand nutritional needs of camels, the value

of the feeds, feedstuff and pastures, as well a macro and micro nutrients. Pasture production, grazing management, rangeland maintenance, rangeland degradation, and pollutants are major areas of reported research. Effects of dehydration and rehydration on water use are mportant along with emerging research documenting how gentle the animals are on the landscape.

Physiology. There has been a significant increase in the number of scientific papers devoted to the physiology of the dromedary camel. Subjects covered include: all organs, blood components, a large range of biochemicals, hormones, reproductive organs, vision, dehydration and hydration biochemistry, trace elements, heavy metals, composition of milk, energetics, salt balance and stress response factors, etc.

Anatomy. There has been a great deal of interest on the details of how camels are put together! There are numerous papers describing the macro and micro of: the bony structure and how it develops and works; the musculature; the placement and description of organs; vision, olfactory and auditory structures; the humps; and especially morphology of the nervous and vascular systems. Ultrasound techniques are being used to describe the mammary glands, teats, development of the embryo and fetus, etc.

Camel-based products. There are a number of important camel-based products and uses of the Arabian camels—milk, meat and fiber. Milk is one of the most valuable products of the camel and interest in it seems to be growing. (Wernery 2006). Research has focused on the composition, yields, nutritional and therapeutic uses for humans, the microbial species, and dairy herd systems. Camels appear to be increasingly used for meat as indicated by research on meat quality, characteristics, and contaminants.

Assisted reproduction. It seems that camel reproduction is difficult to manage and there is a desire to increase the reproductive capacity of dromedary herds and specific breeds. In the last 5 years, there has been a lot of research on the development of techniques and procedures for in vitro maturation of fertilized eggs; in vitro fertilization; nuclear transfer; cryopreservation techniques for ova, embryos and sperm; in vivo maturation with hormonal treatments; and artificial insemination. Tibary (2005) summarizes some of the factors related to reproduction.

Parasites: The current literature documents a lot of research that is being conducted on the common parasites of the Dromedary camels. In this section, studies report on the taxonomy of strains and geographical distributions of this and other pests as well as epidemiological factors and control of such diseases.

Tapeworms. There are a number of tapeworm species that affect the gastrointestinal systems and therefore the general health of camels, but the most important one is Echinococcus species-- especially E. granulosus which causes the disease hydatidosis/cystic echinococcosis in many animals including humans in many parts of the world. Other important nematode parasitic species are listed by Chhabra (2006) and Aypak (2007).

Arthropod parasites, flies, and pathogenic fungi. Ticks, mites, and biting flies affect the life and health of camels by causing a number of potentially fatal diseases. Due to their importance, researchers are reporting a lot of studies on these pests. Articles detail the taxonomy of these pests, what sort of damage they cause to camels and how to control and treat the infestations and secondary conditions that result from these pests. These pests and the diseases they transmit are also important to human health.

A number of potentially fatal diseases are transmitted by a variety of biting flies. They can pass on other disease like protozoal blood pathogens such as Trypanosoma species. In some cases, the larva are very destructive and potentially fatal. Some of the economically important flies include the tsetse fly, (Glossina), screw worms (Chrysomyia species), nasal bot flies (Cephalopina titillator) which cause myiasis, and several species of horse flies (Tabanus sp.) which can transmit a variety of diseases and pathogens.

There are reports that several species of ticks are dangerous arthropod pests of camels as they can transmit a number of protozoan diseases such as Theileria ssp and Babesia.

Sarcoptic mange or scabies is a scourge of many animals and camels can become very ill from the infection of this mite parasite--Sarcoptes scabiei var. cameli. Articles deal with treatment and mite control.

Skin fungi, dermatophytes, cause skin lesions that can lead to secondary infections. Research

currently reports on mycoses caused by Microsporum nanum and various Trichophyton species. Epidemiolgy, methods of treatment and control are also reported (see Ebrahimi, 2007).

Diseases—viral and bacterial. As with all animals, camels are vulnerable to a variety of viral and bacterial pathogens. The articles in this document identification, geographic distribution, epidemiology, treatment and control of many microbial pathogens.

Viral diseases. Major viral diseases include: Rift Valley Fever, CPD, contageous pustular dermatitis, bluetongue disease, camel pox, rabies, bovine herpes virus, foot and mouth disease and a few others.

Bacterial diseases. Camel-related articles on bacterial pathogens list a number of bacterial families that cause disease in many animals including humans. Abscesses and mastitis are problems, pneumonia is often a cause of death. All organs and other parts of the body are susceptible in these animals. Identification, diagnosis, epidemiology, treatment options, etc. are listed. A partial listing of pathogenic bacteria documented in various articles includes the following: Escherichia coli, Bacillus cereus, Pseudomonas aeruginosa, Micrococcus, Corynebacterium bovis, Balantidium coli, Eimeria, Proteus, Staphylococcus aureus, Brucell abortus, Salmonell sp, Coxiella burnetii,Mycobacterium sp, Streptococcus, sp. etc.

Veterinary procedures/care/ drugs

Veterinary care. The veterinary care is obviously expanding as more and more people are trained and they are interacting with more and more of the camel populations in their countries. The emphasis of research is on diagnosis, treatment, suggested prevention of diseases, etc.

Drugs. Most of the current research is on exploring a variety of various types of drugs/ pharmaceuticals. The types of drugs in this document include sedatives, anesthetics, antimicrobials, antiparasitic drugs, ethoveterinary treatments, rehydration solutions, etc. The data includes pharmacokinetics, excretion profiles, metabolic effects and especially the secretion of drug metabolites by lactating females into milk.

In summary, the research in this bibliography shows a continuing interest in all aspects of the old world camels. These "ships of the desert" are still vitally important and have major roles to play in the lives of many people in the 21st Century.

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Links for description of wild Bactrian. http://www.wildcamels.com/ and http://news.bbc.co.uk/earth/hi/earth_news/newsid_8151000/8151804.stm

For an interesting historical article on the importation of camels into the United States in the 1850's, see the following article: The Government's Importation of Camels: A Historical Sketch by Charles C. Carroll. http://www.nal.usda.gov/awic/pubs/camelimport.htm

Military Camels: Marching Into History with the U.S. Camel Corps
http://www.army.mil/-news/2009/04/26/19778-hump234-marching-into-history-with-the-us-camel-corps/

This information resource compiled by the US Army's Military History Institute contains a short bibliography on the use of camels in the military. A number of references are to historical resources on camel importation and the experience of the US Army Camel Cavalry Corps in the 19th century. Other historical topics include anecdotal information on US military use in other countries as well as camels used for military purposes in foreign situations.

Bactrian

2008

Al Swailem, AM; Al Busadah, KA; Shehata, MM; Askari, E. **The role of parentage studies in Arabian and Bactrian camel's pedigree verification.** *Journal of Food Agriculture and Environment.* 2008 Apr; 6(2): 280-285. ISSN: 1459-0255
URL: http://www.world-food.net/scientificjournal.php
NAL call no: S494.5.S86 F663
Abstract: Molecular marker technologies have revolutionized the way animal genetics research is conducted. The development of DNA-based genetic markers has had a revolutionary impact on animal genetics. For commercial breeders, DNA typing offers a new and powerful test for collecting information on their animals and to enhance genetic improvement through the selection of high performance progeny. The identification of markers for traits of economic importance will also facilitate the selection of superior animals in the future. The present study was conducted to evaluate the use of RAPD markers in parentage relations and to investigate misidentification paternity frequency in self and cross-species of Arabian and Bactrian camels. Some mating groups and offspring's exhibited a homogeneous pattern indicative of a very low level of DNA polymorphism and the others showed a low heterogeneous polymorphism. Cluster analysis revealed two main clusters of the S (Sufer) group with 89-92% similarity, two main clusters of the M (Magaheem) group and the sire of this group is 76% genetically similar to the dams and their offspring, one main cluster of the G (Shogeh) group and one offspring out of group with 91% similarity. On the other hand, cluster analysis of the B (Bactrian) group revealed three main clusters. Cluster A consisted of dam 2 and 3 pregnant from Arabian sire. Cluster B includes 4 samples and subdivided into 2 subgroups; Subgroup A includes dam 10 Bactrian pregnant from Arabian sire and its offspring, Subgroup B includes mother 12 Bactrian pregnant from Arabian sire and its offspring with 0.84- 0.89 similarity matrix. Cluster C consisted of 3 subgroups; Subgroup A includes Bactrian dam pregnant from Arabian sire and Bactrian dam pregnant from Bactrian sire, Subgroup B includes Bactrian dam pregnant from Arabian sire and the offspring of Bactrian dam and Bactrian sire, Subgroup C includes 3 samples: 2 Bactrian dams pregnant from Bactrian sire and one of their offspring with 0.89-0.92 similarity matrix. Amplification products of the sires, dams and offspring's revealed the presence of common and specific markers. Thus, RAPD-DNA-based markers are powerful tools for parentage studies in camel.
Descriptors: Arabiancamels, Bactrian camels, genetics research, DNA-based genetic markers, parentage studies, cluster analysis, RAPD markers, parentage relations, paternity frequency in self and cross species.

Conesa, C; Sanchez, L; Rota, C; Perez, MD; Calvo, M; Farnaud, S; Evans, RW. **Isolation of lactoferrin from milk of different species: calorimetric and antimicrobial studies.** *Comparative Biochemistry and Physiology B, Biochemistry and Molecular Biology*. 2008; 150(1): 131-139.

ISSN: 1096-4959

Abstract: Lactoferrin (LF) is an iron-binding glycoprotein found in different biological fluids of mammals and in neutrophils. It has been proposed to be involved in many functions, including protection from pathogens. In this work, purification of lactoferrin using an ion-exchange chromatography (SP-Sepharose) was attempted for the milk of the following animals: sheep (*Ovis aries*), goat (*Capra hircus*), camel (*Camelus bactrianus*), alpaca (*Lama pacos*), elephant (*Elephas maximus*) and grey seal (*Halichoerus grypus*), as well as human (*Homo sapiens*). Lactoferrin was identified in all the milks apart from that from grey seal. The thermal stability of the purified lactoferrins, in their native and iron-saturated forms, was studied by differential scanning calorimetry (DSC). Maximum temperature, onset temperature and enthalpy change of denaturation were higher when lactoferrins were saturated with iron than in their native form, indicating an increase in the stability of the protein structure upon iron-binding. Human lactoferrin was found to be the most heat-resistant and the other lactoferrins presented different degrees of thermoresistance, that of elephant being the least resistant. The antimicrobial activity of the different isolated lactoferrins was investigated against Escherichia coli 0157:H7. The minimal inhibitory concentrations (MICs) were determined by measuring the absorbance at 620 nm. The minimum bactericidal concentrations (MBCs) were also measured and it was found that camel lactoferrin was the most active lactoferrin against E. coli 0157:H7, whereas alpaca and human lactoferrins were the least active. Reproduced with permission of CAB.

Descriptors: sheep, goat, Bactrian camel, alpaca, elephant, grey seal, humans, milk, antibacterial properties, calorimetry, lactoferrin, protein analysis, bactericidal properties, calorimetric methods.

Faye B; Sinyavskiy Y.(Editors). ***NATO Advanced Research Workshop on Impact of Pollution on Animal Products, Almaty, Kazakhstan; September 27-30, 2007***. Published by Springer, Dordrecht, Netherlands. 2008. ISSN: 1871-4668 (print). ISBN: 9781402083570

Descriptors: Dromedary camels, Bactrian camels, minerals, in milk, heavy metals, and trace minerals, in milk, plant pollutants, water pollutants, pollutants in camel milk, heavy metals and trace elements, in camel tissues, hydrotelluric and industrial fluorosis survey in Mrocco.

Gorakh Mal; Sena, DS. **Physical characterisation, haematological and mineral profiles in Bactrian camels.** *Indian Veterinary Journal*. 2008; 85(4): 408-410. ISSN: 0019-6479

URL: http://www.indvetjournal.com

Abstract: A report on the door to door survey conducted in the Nobra valley of Ladakh in India in November 2000 which examines the physical characteristics, haematology, and mineral profiles of Bactrian camels (*Camelus bactrianus*) from different camel owners in the area is discussed.

Descriptors: dromedary camels, Bactrian camels, physical characteristics, body measurements, girth, heart measurements, hematology, mineral profiles, calcium, cobalt, copper, hematology, hemoglobin, iron, magnesium, manganese, potassium, sodium, zinc, India.

Konuspayeva, G; Lemarie, E; Faye, B; Loiseau, G; Montet, D. **Fatty acid and cholesterol composition of camel's (*Camelus bactrianus*, *Camelus dromedarius* and hybrids) milk in Kazakhstan.** *Dairy Science and Technology*. 2008; 88(3): 327-340. ISSN: 1958-5586. Note: In English with summaries in Chinese and French.

URL: http://www.dairy-journal.org

Abstract: The fatty acid composition and cholesterol content of 22 camel's milk samples from different regions of Kazakhstan were determined, in different seasons and with different camel species (Bactrian, dromedary and hybrids). Camel milk fat differed from mammalian fats by its high content of the long-chain fatty acids C14:0, C16:0, C18:0 and C18:1. Great differences in fatty acid composition occurred between regions. Short-chain fatty acids (C8:0 and C10:0) were in higher proportion in spring and long-chain fatty acids (C17:0 and C17:1) in autumn. Dromedary milk had a higher proportion of C17:0iso and C18:1 than Bactrian milk. The ratio of unsaturated/saturated acid was more favorable in camel's milk compared with that of cows or other mammalians. All of these parameters gave a nutritional advantage to camel's milk, although it had a higher content of cholesterol (37.1 mg 100 g-1) than cow's milk. Multivariate analysis allowed the identification of four types of fatty acid profiles with a clear opposition between the samples rich in short-chain fatty acids and the samples rich in long-chain fatty acids. These results confirmed that environmental and farming conditions allowed modulation of the lipid composition of camel's milk. Reproduced with permission of CAB.

Descriptors: cows, dromedary camels, Bactrian camels, camel-milk, composition, cholesterol levels, milk fats, fatty acids, hybrids, lipids, short chain fatty acids, butterfat, Central Asia, Kazakhstan.

Kvac, M; Sak, B; Kvetonova, D; Ditrich, O; Hofmannova, L; Modry, D; Vitovec, J; Xiao, LH**: Infectivity, pathogenicity, and genetic characteristics of mammalian gastric *Cryptosporidium* spp. in domestic ruminants.** *Veterinary Parasitology*. 2008; 153(3/4): 363-367. ISSN: 0304-4017

Abstract: Farm ruminants were infected experimentally with four mammalian gastric *Cryptosporidium*, namely *Cryptosporidium andersoni* LI03 originated from cattle and three isolates of *Cryptosporidium muris* from brown rat (isolate RN66), Bactrian camel (isolate CB03) and firstly characterized isolate from East African mole rat (isolate TS03). Sequence characterizations of the small-subunit rRNA gene showed that the LI03 isolate was *C. andersoni* and the other three isolates belonged to *C. muris*, although the TS03 isolate showed unique sequence variations (one single nucleotide change and four nucleotide insertions). *C. andersoni* LI03 was infectious for calves only, whereas lambs and kids were susceptible to *C. muris* CB03. *C. muris* TS03 and RN66 were not infectious for any farm ruminants. Infection dynamics including prepatent and patent period and infection intensity of the isolates used differed depending on the host species, but no clinical signs of cryptosporidiosis were observed in any of experimentally infected hosts. *Cryptosporidium* developmental stages were only detected in infected animals in the abomasum region. Histopathological changes were characterized by dilatation and epithelial metaplasia of infected gastric glands with no significant inflammatory responses in the lamina propria.

Descriptors: cattle, brown rat, Bactrian camel, lambs, goat kids,cryptosporidiosis, experi-

mental infections, histopathology, intestines, livestock, pathogenesis, protozoal infections, *Cryptosporidium muris*, *Cryptosporidium andersoni*.

Mal, Gorakh; Sena, D Suchitra. **Physical characterisation, haematological and mineral profiles in Bactrian Camels (vol 85, pg 409, 2008)**. *Indian Veterinary Journal.* 2008; 85(6): 28. ISSN: 0019-6479
URL: http://www.indvetjournal.com
Descriptors: Bactrian camels, description, physical charateristics, mineral profile, hematology, blood profile.

Moser, I; Prodinger, WM; Hotzel, H; Greenwald, R; Lyashchenko, KP; Bakker, D; Gomis, D; Seidler, T; Ellenberger, C; Hetzel, U; Wuennemann, K; Moisson, P. ***Mycobacterium pinnipedii*: Transmission from South American sea lion (*Otaria byronia*) to Bactrian camel (*Camelus bactrianus bactrianus*) and Malayan tapirs (*Tapirus indicus*).** *Veterinary Microbiology*. 2008 Mar 18; 127(3-4): 399-406. ISSN: 0378-1135
DOI: http://dx.doi.org/10.1016/j.vetmic.2007.08.028
NAL call no: SF601.V44
Abstract: Tuberculosis infections caused by *Mycobacterium (M.) pinnipedii* in a South American sea lion, Bactrian camel, and Malayan tapirs kept in two zoological gardens spanning a time period of 5 years are reported. The zoos were linked by the transfer of one tapir. Conventional bacteriological and molecular methods were applied to detect the pathogen. Spoligotyping and MIRU/VNTR-typing performed to assess the genetic similarity revealed identical molecular characteristics of the isolates from all animals involved. Anti-tuberculosis antibodies were detected using ELISA and a recently developed serological rapid test. The study shows that: (i) using molecular methods, the assessment of the genetic relationship of infectious agents helps to confirm the routes of infection, and that (ii) immunological tests may help to detect tuberculosis infections ante mortem more reliably and early. This would prevent the transfer of tuberculosis by asymptomatic animals.
Descriptors: *Mycobacterium pinnipedii*, Otariidae, Bactrian camels, Malayan *Tapirus*, zoological gardens, mycobacterial diseases, disease transmission, disease detection, tuberculosis, animal diseases; anti-tuberculosis antibodies detected.

Nikjou, D; Naslaji, A; Skidmore, JA; Mogheiseh, A; Razavi, K; Gerami, A; Ghanbari, A. **Synchronization of follicular wave emergence prior to superovulation in Bactrian camel (*Camelus bactrianus*).** *Theriogenology*. 2008 Mar 1; 69(4): 491-500. ISSN: 0093-691X
DOI: http://dx.doi.org/10.1016/j.theriogenology.2007.10.020
NAL call no: QP251.A1T5
Abstract: This study was conducted to synchronize follicle wave emergence prior to superovulation using either GnRH or progestogen treatments, in Bactrian camels. GnRH group camels (n =5) received 20og of the GnRH analogue Buserelin on Days -18 and -4 of the experiment (initiation of superovulation=Day 0). Camels in the progestogen group (n =5) received two consecutive treatments of progestogens, 7 days apart, on Days -14 and -8 of the experiment. On each occasion, each female received three norgestomet implants and 200mg progesterone (i.m.) and all implants were removed 14 days after the first progesto-

gen treatment coinciding with Day -1 of superovulation. A combination of eCG and FSH was used to induce superovulation and the growth of all subsequent follicles and CLs were monitored daily by ultrasonography. Following the first GnRH injection, mature follicles ovulated within 1-2 days, and a new follicle wave emerged after 3pl0.77 days. At the time of the second GnRH injection, a mature follicle (15.6pl0.97mm) ovulated and a new follicular wave emerged between 1 and 2 days after GnRH injection. Growing follicles at the time of the first progestogen treatment became either atretic (n =1) or persistent (n =4) and a new follicle wave (n =3) emerged 3-6 days later. At the initiation of superovulation, the diameters of the largest follicle in GnRH and progestogen groups were 7.4pl0.59 and 20.5pl2.26mm, respectively but after superovulation and mating there was no significant differences in the number of unovulated follicles or CLs between groups. In conclusion, two GnRH injections, 14 days apart, may be used to synchronize follicle wave emergence in Bactrian camel.
Descriptors: Bactrian camels,synchronize follicle wave emergence prior to superovulation, either GnRH, progestogen treatments, technique development, timing of treatments, hormone levels, unovulating follicles.

Odbileg, R; Purevtseren, B; Gantsetseg, D; Boldbaatar, B; Buyannemekh, T; Galmandakh, Z; Erdenebaatar, J; Konnai, S; Onuma, M; Ohashi, K. **Cytokine responses in camels (*Camelus bactrianus*) vaccinated with *Brucella abortus* strain 19 vaccine.** *Journal of Veterinary Medical Science.* 2008; 70(2): 197-201. ISSN: 0916-7250
URL: http://www.soc.nii.ac.jp/jsvs
Abstract: In the present study, we determined the levels of cytokines produced by camel (*Camelus bactrianus*) peripheral blood mononuclear cells (PBMCs) in response to live attenuated *Brucella abortus* (B. abortus) S19 vaccine. Seven camels were vaccinated with commercial *B. abortus* S19 vaccine, and their cytokine responses were determined using a real-time PCR assay. Cytokine responses to *B. abortus* S19 were examined at 6 hr, 48 hr and 1, 2 and 3 weeks post-vaccination. Serological tests were performed to further confirm these immune responses. The results revealed that IFN- gamma and IL-6 were upregulated during the first week post-vaccination. Low level expressions of IL-1 alpha , IL-1 beta , TNF alpha and IL-10 and no expression of IL-2 and IL-4 were observed compared with the control camels. The findings showed that *B. abortus* stimulates cell-mediated immunity by directly activating camel Th1 cells to secrete IFN- gamma. This quantification of cytokine expression in camels is essential for understanding of Camelidae disease development and protective immune responses. This is the first report of in vivo camel cytokine quantification after vaccination.
Descriptors: Bactrian camels, *Brucella abortus,* brucellosis, cell mediated immunity, cytokines, humoral immunity, immune response, immunization, interferon, interleukin 1, interleukin 10, interleukin 6, live vaccines, strains, tumor necrosis factor, vaccination, attenuated vaccines, cachectin, cachexin, cellular immunity, immune sensitization, immunity reactions, immunological reactions, tumor necrosis factor.

Wang, Rongjun; Zhang, Longxian; Ning, Changshen; Feng, Yaoyu; Jian, Fuchun; Xiao, Lihua; Lu, Biao; Ai, Weichang; Dong, Heping. **Multilocus phylogenetic analysis of *Cryptosporidium andersoni* (*Apicomplexa*) isolated from a Bactrian camel (*Camelus bactrianus*) in China.** *Parasitology Research.* 2008 Apr; 102(5): 915-920. ISSN: 0932-0113

DOI: http://dx.doi.org/10.1007/s00436-007-0851
NAL call no: QL757.P377
Abstract: This is the first report of cryptosporidiosis in a Bactrian camel (*Camelus bactrianus*) in China. Two *Cryptosporidium* isolates derived from the same Bactrian camel (3-year-old) in November 2005 and April 2006 were characterized using sequence and phylogenetic analysis of the small-subunit rRNA (18S rRNA), 70-kDa heat shock protein (HSP70), actin and *Cryptosporidium* oocyst wall protein (COWP) genes. The sequences of the 18S rRNA and COWP were identical to all other *Cryptosporidium andersoni* isolates although minor differences were noticed between the isolates and the USA isolate at the actin locus (99.2% of similarity). The sequence of the HSP70 was identical to the Japanese *C. andersoni* isolate, with a minor difference from the Australian *C. andersoni* isolate (99.7% of similarity). Cross-transmission studies demonstrated that the *C. andersoni* isolates did not infect immunosuppressed or immunocompetent Kun-ming mice, severe combined immunodeficiency mice, and immunosuppressed or immunocompetent calves. Among the *C. andersoni* isolates reported so far, only isolates from Japan could infect SCID mice. Thus, the *C. andersoni* isolates from the bactrian camel were biologically similar to most bovine *C. andersoni* isolates characterized so far, but are different from bovine isolates from Japan.
Descriptors: cryptosporidosis, Bactrian camel, case study, molecular studies, sequence and phylogenetic analysis, 18S rRNA, HS70, actin, oocyst wall protein, *Cryptosporidium andersoni*. China.

2007

Balmus, Gabriel; Trifonov, Vladimir A; Biltueva, Larisa S; O' Brien, Patricia CM; Alkalaeva, Elena S; Fu, Beiyuan; Skidmore, Julian A; Allen, Twink; Graphodatsky, Alexander S; Yang, Fengtang; Ferguson-Smith, Malcolm A. **Cross-species chromosome painting among camel, cattle, pig and human: further insights into the putative Cetartiodactyla ancestral karyotype.** *Chromosome Research.* 2007 June; 15(4): 499-514. ISSN: 0967-3849
DOI: http://dx.doi.org/10.1007/s10577-007-1154-x
NAL call no: QH600 .C47
Abstract: The great karyotypic differences between camel, cattle and pig, three important domestic animals, have been a challenge for comparative cytogenetic studies based on conventional cytogenetic approaches. To construct a genome-wide comparative chromosome map among these artiodactyls, we made a set of chromosome painting probes from the dromedary camel (*Camelus dromedarius)* by flow sorting and degenerate oligonucleotide primed-PCR. The painting probes were first used to characterize the karyotypes of the dromedary camel (*C. dromedarius*), the Bactrian camel (*C. bactrianus*), the guanaco (*Lama guanicoe*), the alpaca (*L. pacos*) and dromedary x guanaco hybrid karyotypes (all with 2n = 74). These FISH experiments enabled the establishment of a high-resolution GTG-banded karyotype, together with chromosome nomenclature and idiogram for *C. dromedarius*, and revealed that these camelid species have almost identical karyotypes, with only slight variations in the amount and distribution patterns of heterochromatin. Further cross-species chromosome painting between camel, cattle, pig and human with painting probes from the

camel and human led to the establishment of genome-wide comparative maps. Between human and camel, pig and camel, and cattle and camel 47, 53 and 53 autosomal conserved segments were detected, respectively. Integrated analysis with previously published comparative maps of human/pig/cattle enabled us to propose a Cetartiodactyla ancestral karyotype and to discuss the early karyotype evolution of Cetartiodactyla. Furthermore, these maps will facilitate the positional cloning of genes by aiding the cross-species transfer of mapping information.

Descriptors: camels, dromedaries, Bactrian, guanacos, alpacas, cytogenetics, evolution, *Lama*, Cetartiodactyla, chromosome painting, karyotype.

Beniwal, BS; Singh, RP. **Haemato-biochemical changes in camels suffering from pica.** *Annals of Agri Bio Research.* 2007; 12(1): 83-86. ISSN: 0971-9660

Abstract: Haematological and biochemical studies were carried out in 60 camels suffering from pica. Twenty apparently healthy camels served as controls. The haemogram of affected camels revealed significant decrease in hemoglobin, total erythrocyte count, packed cell volume, mean corpuscular volume and mean corpuscular haemoglobin, indicating microcytic hypochromic anaemia. Erythrocyte sedimentation rate and eosinophils were significantly high in affected animals. The total leukocyte count, neutrophils, lymphocytes and monocytes percentage and osmotic fragility of erythrocytes remained unaffected. Affected camels had significantly low levels of serum calcium, inorganic phosphorus, zinc and copper, whereas sodium, potassium, magnesium, chloride and manganese values were within normal range. Reproduced with permission of CAB.

Descriptors: dromedary camels, Bactrian camels, pica behavior, anemia, red blood cells, erythrocytes, white blood cells, eosinophils, hematology, hemoglobin value, leukocyte counts, lymphocytes, monocytes, neutrophils, blood chemistry, calcium, chloride, copper, magnesium, manganese, phosphorus, potassium, sodium, zinc.

Chen JingChen; Gao ChengJuan; Bai ZhongTian; Wang JianLin. **Morphological comparisons of the brain of the Bactrian camel (*Camelus bactrianus*) between a near term foetus and the adult.** *Journal of Camel Practice and Research.* 2007; 14(2): 139-142. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The comparison of the morphology of the brain of Bactrian camel between a near term foetus and adults was performed. The results showed that the near term camel had a relatively mature brain about 50% the size of the adult. The cerebellum was about 40% of that of the adult in weight. The pituitary was large, with about 67% the length of the adult in diameter. Yet the surface area of the cerebrum and area of corpus callosum on sagittal surface were relatively small, of which both ratio to those of the adult were about 1:3. Unlike the adult, the olfactory bulb was invisible from dorsal view and the sulci on the surface of the brain were not as deep as the adult. Besides, the brain stem had a remarkable downward inclination. Reproduced with permission of CAB.

Descriptors: Bactrian camels, fetuses, animal anatomy, brain, cerebrum, fetal development.

Cui, Peng; Ji, Rimutu; Ding, Feng; Qi, Dan; Gao, Hongwei; Meng, He; Yu, Jun; Hu, Songnian; Zhang, Heping. **A complete mitochondrial genome sequence of the wild two-humped camel (*Camelus bactrianus ferus*): an evolutionary history of camelidae.** *BMC Genomics.*

2007; 8: Article No.: 241. ISSN: 1471-2164
URL: http://www.biomedcentral.com/bmcgenomics/
Abstract: Background: The family Camelidae that evolved in North America during the Eocene survived with two distinct tribes, Camelini and Lamini. To investigate the evolutionary relationship between them and to further understand the evolutionary history of this family, we determined the complete mitochondrial genome sequence of the wild two-humped camel (*Camelus bactrianus ferus*), the only wild survivor of the Old World camel. Results: The mitochondrial genome sequence (16,680 bp) from *C. bactrianus ferus* contains 13 protein-coding, two rRNA, and 22 tRNA genes as well as a typical control region; this basic structure is shared by all metazoan mitochondrial genomes. Its protein-coding region exhibits codon usage common to all mammals and possesses the three cryptic stop codons shared by all vertebrates. *C. bactrianus ferus* together with the rest of mammalian species do not share a triplet nucleotide insertion (GCC) that encodes a proline residue found only in the nd1 gene of the New World camelid *Lama pacos*. This lineage-specific insertion in the L. pacos mtDNA occurred after the split between the Old and New World camelids suggests that it may have functional implication since a proline insertion in a protein backbone usually alters protein conformation significantly, and nd1 gene has not been seen as polymorphic as the rest of ND family genes among camelids. Our phylogenetic study based on complete mitochondrial genomes excluding the control region suggested that the divergence of the two tribes may occur in the early Miocene; it is much earlier than what was deduced from the fossil record (11 million years). An evolutionary history reconstructed for the family Camelidae based on cytb sequences suggested that the split of Bactrian camel and dromedary may have occurred in North America before the tribe Camelini migrated from North America to Asia. Conclusion: Molecular clock analysis of complete mitochondrial genomes from *C. bactrianus ferus* and *L. pacos* suggested that the two tribes diverged from their common ancestor about 25 million years ago, much earlier than what was predicted based on fossil records.
Descriptors: Bactrian camel, *Camelus bactrianus ferus*, *Lama pacos*, alpacas, cryptic stop codons, moledular genetics, MtDNA, tRNA, rRNA, divergent genetics, common ancestor.

Duraffour, S; Snoeck, R; Krecmerova, M; Oord, J van den; Vos, R de; Holy, A; Crance, JM; Garin, D; Clercq, E de; Andrei, G. **Activities of several classes of acyclic nucleoside phosphonates against camelpox virus replication in different cell culture models.** *Antimicrobial Agents and Chemotherapy*. 2007; 51(12): 4410-4419. ISSN: 0066-4804
URL: http://aac.asm.org/
Abstract: Camelpox virus (CMLV) is the closest known virus to variola virus. Here we report on the anti-CMLV activities of several acyclic nucleoside phosphonates (ANPs) related to cidofovir [(S)-1-(3-hydroxy-2-phosphonomethoxypropyl)cytosine (HPMPC; Vistide)] against two CMLV strains, CML1 and CML14. Cytopathic effect (CPE) reduction assays performed with human embryonic lung fibroblast monolayers revealed the selectivities of the first two classes of ANPs (cHPMPA, HPMPDAP, and HPMPO-DAPy) and of the hexadecyloxyethyl ester of 1-{[(5S)-2-hydroxy-2-oxido-1,4,2-dioxaphosphinan-5-yl] methyl}-5-azacytosine (HDE-cHPMP-5-azaC), belonging to the newly synthesized ANPs, which are HPMP derivatives containing a 5-azacytosine moiety. The inhibitory activities of ANPs against both strains were also confirmed with primary human keratinocyte (PHK)

monolayers, despite the higher toxicity of those molecules on growing PHKs. Virus yield assays confirmed the anti-CML1 and anti-CML14 efficacies of the compounds selected for the highest potencies in CPE reduction experiments. Ex vivo studies were performed with a 3-dimensional model of human skin, i.e., organotypic epithelial raft cultures of PHKs. It was ascertained by histological evaluation, as well as by virus yield assays, that CMLV replicated in the human skin equivalent. HPMPC and the newly synthesized ANPs proved to be effective at protecting the epithelial cells against CMLV-induced CPE. Moreover, in contrast to the toxicity on PHK monolayers, signs of toxicity in the differentiated epithelium were seen only at high ANP concentrations. Our results demonstrate that compounds belonging to the newly synthesized ANPs, in addition to cidofovir, represent promising candidates for the treatment of poxvirus infections.

Descriptors: Bactrian camels, animal viral diseases, cidofovir, antiviral agents, antiviral properties, viral diseases, viral replication, Poxviridae.

Gahlot, TK (editor). ***Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007.*** College of Veterinary & Animal Science, Rajasthan, India: 2007; iii + 226 pp.

Abstract: A total of 78 papers presented at the International Camel Conference are included in this supplement. The topics discussed include disease diagnosis and treatment, breeding and genetics, immunology, microbiology, reproduction, ethnoveterinary practice, camel husbandry, management practices, nutrition, surgery, anatomy, physiology, pharmacology, milk, draft power, production and parasitology. Reproduced with permission of CAB.

Descriptors: Bactrian camels, dromedary camels, camel milk, anatomy, breeding camel diseases, camel husbandry, nutrition, physiology, bacterial diseases, diagnosis, draft animals, genetics, immunology, parasitology, parasitoses, pharmacology, therapeutics, viral infections, reproduction, surgery, therapy, veterinary practice, viral diseases, working animals.

Kataria , AK . **Camel immunology: myths and facts.** In: TK Gahlot(Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 63-67.

Abstract: Camel has a low susceptibility to diseases and suffers comparatively with lesser infections. The low susceptibility of camel to pathogens has led to a belief that camel's immune system is either more potent in combating the infections or is unique and different from other mammalian species. But as camel is confined to only some parts of the world where due scientific attention has not been paid, only little research has accumulated on this species. The earliest information remained limited to estimation of total serum proteins followed by reports on fractionation of serum proteins and quantification of immunoglobulins. Afterwards, much attention of the scientists throughout the globe remained confined to detection of serum antibodies developed against common diseases. But the important discovery about presence of unusual heavy chain antibodies (HCAbs or nanobodies) in serum of camel ignited the interest in camel research throughout the world and henceforth, lot of work has been carried out on the camel immunoglobulins and their properties. The immunology of camel has been studied more in regards to its immunoglobulins with specific emphasis on heavy chain antibodies. Functional heavy chain immunoglobulins have, so far,

only been found in camels and llamas. The HCAbs constitute approximately 75% of the IgG in camel serum. In my opinion, there are no myths about camel's immunology but only facts prevail. The paper reviews some important aspects of camel immunology in terms of isolation and identification of immunoglobulins and structure, physico-chemical properties, antigen-binding properties, antimicrobial activities, evolution and application of nanobodies. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, antibodies, disease resistance, IgG, immune system, immunity, immunoglobulins, immunology, susceptibility, gamma globulins, immune globulins, resistance to disease.

Konuspayeva, G; Faye, B; Loiseau, G; Levieux, D. **Lactoferrin and immunoglobulin contents in camel's milk (*Camelus bactrianus*, *Camelus dromedarius*, and Hybrids) from Kazakhstan.** *Journal of Dairy Science.* 2007 Jan; 90(1): 38-46. ISSN: 0022-0302
URL: http://jds.fass.org/cgi/content/abstract/90/1/38
NAL call no: 44.8 J822
Abstract : Lactoferrin (Lf) and IgG were estimated in camel's milk from Kazakhstan, where 2 species of camels (*Camelus bactrianus*, *Camelus dromedarius*) and their hybrids cohabit. The concentrations of Lf and IgG were determined according to 3 variation factors: region (n = 4), season (n = 4), and species (n = 5; sample 4 was mixed milk and sample 5 was of unknown origin). The mean values in raw camel's milk were 0.229 pl 0.135 mg/mL for Lf concentration and 0.718 pl 0.330 mg/mL for IgG concentration. The seasonal effect was the only significant variation factor observed, with the highest values in the spring for Lf and in the winter for IgG. The Lf concentration varied in 1-wk postpartum milk from 1.422 to 0.586 mg/mL. The range in IgG concentration was wide and decreased from 132 to 4.75 mg/mL throughout the 7 d postpartum, with an important drop after parturition. In fermented milk, the lactoproteins are generally hydrolyzed. For milk samples from undefined species, discriminant analyses did not allow the origin of the species to be determined. A slight correlation between Lf and IgG concentrations was observed in raw milk. The values were slightly higher than those reported in cow's milk, but this difference was insufficient to attribute medicinal virtues to camel's milk.
Descriptors: dromedary camels, Bactrian camels, hybrid camels, camel milk, raw milk, milk composition, lactoferrin, immunoglobulin G, species differences, geographical variation, seasonal variation, spring, winter, postpartum period, parturition, fermented milk, milk proteins, proteolysis, Kazakhstan.

Levine, DG; Smith, JJ; Richardson, DW; Brown, V; Beech, J; Habecker, P; Adam, E. **Suspected panosteitis in a camel.** *Journal of the American Veterinary Medical Association.* 2007 Aug 1; 231(3): 437-441. ISSN: 0003-1488
URL: http://www.avma.org/
NAL call no: 41.8 Am3
Descriptors: Bactrian camels, case studies, young animals, males, lameness, legs, flunixin, biopsy, lesions-(animal), tibia, bone formation, bone diseases, adverse effects, metatarsus, disease diagnosis, flunixin-meglumine, panosteitis.

Makhdoomi, DM; Shakeel Ahmad; Kirmani, MA; Banik, S; Sheikh, GN. **Physico-anatomical characteristics of Bactrian versus dromedary with special reference to Ladakh bactrian.** In: TK Gahlot(Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 166-167.

Abstract: The Bactrian of Ladakh is believed to be originated from those amongst the bactrian of China and Mongolia. At a high altitude it got acclimatised to the environment where low oxygen tension and ambient temperatures are the main stress factors for human life to the extent that it became resistant to high altitude diseases. Accordingly the physiological and anatomical features differ from the Bactrian of Mongolia, China and dromedary camel. The paper aims to put on the record some of the physico-anatomical characteristics of Ladakh Bactrian and their comparison with the dromedary camel. Reproduced with permission of CAB.

Descriptors: LadakhBactrian camels, dromedary camels, species origins, species comparison,animal anatomy, morphology, species differences.

Makhdoomi, DM; Banik, S; Shakeel Ahmad; Sheikh, GN; Kirmani, MA. **Perineural anaesthesia as an aid in lameness diagnosis and management in Bactrian camel of Ladakh.** In: TK Gahlot, (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 178-180.

Abstract: The study was done at and around Nobra Valley of Ladakh at an altitude of 18, 300 ft. The 9 double humped camels (6 males and 3 females) ageing 2 to 6 years, 150-450 Kgs formed the subjects of the study The animals manifested clinical signs of ailments like knee injuries 2, bony exostosis 1, tendovaginitis 2 and lameness 4 cases. The perineural analgesia of the fore limb disorders was managed using 2% lignocaine and prior sedation with xylazine hydrochloride. The results of the study will be discussed. Reproduced with permission of CAB.

Descriptors: Bactrian camels, anesthesia, anesthetics, analgesics, diagnosis, diagnostic techniques, exostoses, joint diseases, lameness, lidocaine, lignocaine, preanesthetic medication, resedation, trauma, xylazine, India.

Marai, IFM; Zeidan, AEB. **Artificial insemination in Camelidae.** *Tropical and Subtropical Agroecosystems.* 2007; 7(1): 1-13. Note: In English with a Spanish summary. A review article.

URL: http://www.veterinaria.uady.mx/publicaciones/journal/2007-1/128-camels2.pdf

Abstract: The most important problems of Artificial Insemination (AI) in Camelidae is its timing in relation to ovulation in the she-camel. The present article reviewed collection of semen, processing of semen, manipulation of the female and semen deposition technique in Camelidae species. Commonly, semen is collected by electroejaculation, artificial vagina (AV), flushing of the epididymus with saline solution, while the more accepted methods are the former two methods. Semen is usually used in raw condition or after extension, depending on the method of semen processing. In the fresh raw method, whole semen is used within minutes or after few hours. Extension of the semen ejaculate is carried out by adding extenders and it is required in more efficient use of AI, in short-term preservation or liquid semen (within a few hours or days) and long-term preservation or frozen semen (months

or years). In short-term preservation, semen is used extended under different temperatures (30, 25 or 4 degrees C). Long-term preservation is carried out by cryopreservation. Packaging methods such as pellets, ampoules or in plastic straws with different volumes (0.25, 0.5 or 4 ml) represent different freezing procedures. The quality and survival of spermatozoa of post-thaw semen are highly variable from one male to the other, even after using the same freezing technique. To ensure that the inseminated females ovulate, hormonal manipulation of ovarian activity is used such as the induction of follicular activity and ovulation, as well as, synchronization of these phases in a group of females. The best time for insemination can only be determined by ultrasonography and/or rectal palpation of the ovaries. The other alternative is to inseminate at known intervals following induction of ovulation by hormonal treatment with human-chorionic gonadotropin (hCG) or gonadotropin-releasing hormone (Gn-RH). Reproduced with permission of CAB.

Descriptors: alpacas, Bactrian camels, dromedary camels, guanacos, llamas, vicunas, reproductive techniques, artificial insemination, cryopreservation, deposition site, gonadotropin releasing hormone, GnRH, HCG, estrus, ovulation, synchronization, synchronized females, techniques, spermatozoa, semen, semen diluent additives, semen preservation.

Niasari-Naslaji, A. **Collection, processing and preservation of Bactrian camel semen.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 79-82.

Abstract: This manuscript explains our modifications and approach in semen collection and processing, biophysical characteristics and introduction of a novel extender for preservation (short and long-term storage) of Bactrian camel semen. Semen collection was performed satisfactorily in the Bactrian camel using a modified bovine artificial vagina. Using a very simple, cheap and practical mechanical procedure, described in this review, the viscosity of the semen was successfully reduced, which in turn facilitated further evaluation and processing of semen by providing a liquefied and homogenous specimen. The most two important parameters semen, including pH (7.4+or-0.1) and osmolality (318.2+or-1.9 mOsm/kg H< sub>2</ sub>O), were then used to innovate a novel extender, named SHOTOR diluent for short (24 hrs at 4 degrees C) and long-term (at frozen state) preservation of semen in this species. Reproduced with permission of CAB.

Descriptors: Bactrian camel, artificial insemination, artificial vagina, freezing, frozen semen, osmotic pressure, pH, processing, semen, semen characters, semen diluents, semen-preservation; semen viscosity, AI, hydrogen ion concentration.

Niasari-Naslaji, A; Mosaferi, S; Bahmani, N; Gerami, A; Gharahdaghi, AA; Abarghani, A; Ghanbari, A. **Semen cryopreservation in Bactrian camel (*Camelus bactrianus*) using SHOTOR diluent: Effects of cooling rates and glycerol concentrations.** *Theriogenology*. 2007 Sept 1; 68(4): 618-625. ISSN: 0093-691X

URL: http://dx.doi.org/10.1016/j.theriogenology.2007.04.059

NAL call no: QP251.A1T5

Abstract: Experiments were conducted with a final goal of providing a suitable protocol for cryopreservation of Bactrian camel semen. In Experiment I, the effect of average cooling rate (slow cooling: 0.14 versus fast cooling: 0.55 pC/min) on the viability of chilled semen was

evaluated. In Experiment II, the effect of different concentrations of glycerol (4, 6 and 8%) on the post-thaw viability of frozen sperm was investigated. In Experiment III, the efficiency of SHOTOR diluent was compared with IMV buffers for the cryopreservation of camel semen. Viability parameters including progressive forward motility (PFM), plasma membrane integrity and percentage of live spermatozoa were assessed. Progressive forward motility of sperm cooled at the faster rate was superior after incubating for 24 h at 4 pC compared to that cooled at the slower rate ($P < 0.05$). Post-thaw viability of Bactrian camel sperm was better using a final glycerol concentration of 6% compared to 4 and 8% ($P < 0.05$). Progressive forward motility of frozen-thawed sperm was greater using SHOTOR diluent (29.9%) compared to IMV buffers (4.2%, $P < 0.05$). In conclusion, semen cryopreservation in Bactrian camel is feasible when it is extended in SHOTOR diluent, cooled within 1 h (average cooling rate: 0.55 pC/min) to 4 pC, and then exposed to glycerol, at the final concentration of 6%.

Descriptors: Bactrian camels, semen, cryopreservation, slow cooling, fast cooling, cryoprotectants, glycerol, chemical concentration, semen extenders, spermatozoa, sperm viability, sperm motility.

Qiu HaiYu; Cui Yan. **Observation of distributions blood vessels of renal arteries in Bactrian camel by casting mould technique.** *Veterinary Science in China.* 2007; 37(7): 619-622. ISSN: 1673-4696. Note: In Chinese with an English summary.

URL: http://www.zgsykx.com/

Abstract: The renal artery vessel of Bactrian camel was observed by vessel casting and scanning electron microscopy. The results showed that the renal artery was divided into truncus dorsalis and truncus ventralis and was 4-8 cm away from the renal hilum. The renal arteries entered the renal hilum and divided into many segmental arteries. The renal segmental arteries in the left and right kidneys had their own characteristics. The renal segmental arteries extended to the boundary of the cortex and medulla and then became the arcuate arteries which were in the stretch of the renal segmental arteries but not paralleled with the surface of the kidney. The renal glomus, efferent arteries and afferent arteries in the different regions of the kidney had their own morphology and structural characteristics. The results showed that the distribution regularity of the renal segmental arteries in Bactrian camel kidney was distinct. No anastomosis was observed between the segmental arteries, and some changes were detectable in the formal structure of the glomus.

Descriptors: Bactrian camels, camel anatomy, kidney blood vessel morphology, arteries, vessel casting, electron microscopy, techniques.

Rose, P; Roffe, S; Jermy, M. **Enrichment methods used for bactrian camel (*Camelus bactrianus*) and tufted deer (*Elaphodus cephalophus michianus*) at the East Midland Zoological Society: Twycross Zoo.** *Ratel.* 2007 June; 34(2): 7-11. ISSN: 0305-1218

Descriptors: Bactrian camels, *Camelus bactrianus*, *Elaphodus cephalophus michianus*, captive zoo animals, environmental enrichment stratigies and devices, Twycross Zoo, Warwickshire, England.

She QiuSheng; Li HaiYan; Wang JianLin; Bai ZhongTian. **Topographic anatomy and morphometry of the metacarpus and phalanges in the adult Bactrian camel (*Camelus bactrianus*).** *Journal of Camel Practice and Research.* 2007; 14(2): 143-149. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Fourteen specimens of the metacarpus and digits of the forelimb of adult Bactrian camels were examined by means of radiography, computed tomography (CT), gross anatomy and morphometry. The metacarpal bone is approximately slender and with a long shaft. Two digits are present, the third and fourth are fully developed; each digit has 3 phalanges and 2 proximal sesamoid bones. Under the phalanges of the forefoot, there is a well-developed digital pad which has 3 fat cushions (central, axial and abaxial) and an elastic fibrous cushion breaths phalanges of each digit. The gap of digit joints in radiograph is approximately 6-8 mm, the proximal articular facet area in digital joints is much larger than that of the corresponding distal. The relative density of phalanges in digit III is slightly larger than that of the digit IV, but the weight and volume of phalanges in digit III is slightly smaller than that of the digit IV, respectively. The relative density of axial proximal sesamoid is slightly smaller than that of the abaxial, the weight and volume of axial proximal sesamoid is larger than those of the abaxial, respectively. The distal half of proximal phalanx and middle phalanx are oblique. Reproduced with permission of CAB.
Descriptors: Bactrian camels,animal anatomy, digits, feet, metacarpus, phalanges, morphology, morphometrics, phalanges.

Yakhchalim, M; Cheraghi, E. **Eimeriosis in Bactrian and dromedary camels in the Miandoab region, Iran.** *Acta Veterinaria Beograd*. 2007; 57(5/6): 545-552. ISSN: 0567-8315. Note: In English with a Serbian summary.
Abstract: An investigatin into eimeriosis of camels was carried out in two camel-raising areas of Miandoab region, Iran, to determine the frequency and diversity of *Eimeria* species. Bactrian camels (n=85) and dromedary camels (n=40) which were from one to four years old were subjected to examination. Fecal samples were collected and the flotation technique was carried out to demonstrate the presence of oocysts and sporulation of oocysts. The overall prevalence was 12.8%. Five Eimeria species were identified in both camels: the highest rate belonged to the E. bactriani (42.2%), followed by E. rajasthani (only in dromedary camels, 26.7%), E. pellerdyi (only in bactrian camels, 15.6%), E. cameli (11.1%) and E. dromedarii (4.4.%). All 12.8% of infected camels had mixed infections with at least three species. Feces consistency and infection intensity had a significant correlation with age (P<0,01). The sex and age of the camels had a significant effect on prevalence (P<0.01). These findings may be useful to evaluate the infection potential when considering control programs, specially for young camels. Reprodued with permission of CAB.
Descriptors: Bactrian camels, dromedary camels, fecal testing, age differences, sex differences, coccidiosis, disease prevalence, disease surveys, epidemiology, mixed infections, oocysts, risk factors, seasonal variation, seasonality, coccidian, *Eimeria cameli*, *Eimeria bactriani*, *Eimeria dromedarii*, *Eimeria pellerdyi*, *Eimeria rajasthani*, Iran.

2006

Chhabra , MB; Sangwan, AK **Parasitic diseases of camels - an update. 1. Protozoal diseases.** *Journal of Camel Practice and Research.* 2006; 13(1): 7-14. ISSN: 0971-6777. Note: A review article.

URL: http://www.camelsandcamelids.com

Abstract: Protozoal diseases, particularly trypanosomiasis caused by the flagellate, *Trypanosoma evansi*, are considerable constraints on the health and productivity of the dromedary camels throughout the tropics and subtropics. With the developments in the field of molecular biology and their application in parasitic infections, there has been great progress in the diagnostic techniques. Apart from detection of parasitoses, these tests are useful aids in monitoring the effectiveness of therapeutic interventions. As a consequence, more reliable epidemiological data on the distribution and incidence of these diseases have been generated. DNA-based technologies have enabled the characterization of species, subspecies and stocks (strains) of camel-parasitizing trypanosomes. Chemotherapy and strategic control of trypanosomiasis continue to be another fertile area which has witnessed a fair number of recent reports. Other protozoan parasites and their occasional association with disease are now being reported more frequently. These include the gut-dwelling coccidia, the tissue-cystic forms (*Sarcocystis* and *Toxoplasma*), *Balantidium*, *Cryptosporidium* and others. Possible changes in camel husbandry practices may lead to increase in their prevalence and economic impact. As such, there is need to include these in the overall parasitic disease surveillance among camels. Reproduced with permission of CAB.

Descriptors: dromedary camels, Bactrian camels, parasitic diseases, clinical aspects, diagnosis, diagnostic techniques, disease prevalence, disease control, disease prevention, epidemiology, blood chemistry, hematology, histology, urine testing, cysts developmental stages, drug therapy, pathogen strains coccidiosis, cryptosporidiosis, neosporosis, protozoal infections, theileriosis, toxoplasmosis, trypanosomiasis, Balantidium coli, *Besnoitia*, *Cryptosporidium,Eimeria cameli,Eperythrozoon*, *Haemonchus longistipes*, *Hammondia heydorni*, *Neospora caninum,Sarcocystis cameli*, *Theileria*, *Toxoplasma gondii*, *Tritrichomonas foetus,Trypanosoma evansi*, *Secernentea*, *Strongylida*, antigens, antiprotozoal agents, drugs.

Du Xiao hua; Liu Xia; Liu Ying ; Wang Jian lin. **Observation on the architecture of subpleural pulmonary microvasculature, in Bactrian camel (*Camelus bactrianus*) under SEM.** *Jiepou Xuebao.* 2006; 37(1): 87-90. ISSN: 0529-1356

Abstract: Objective To study the architecture of the subpleural pulmonary, microvasculature and its functional relationship in the bactrian camel. Methods The replica scanning electron microscopic method was used. Results According to their continuous branches, the subpleural pulmonary microvasculatures were recognized into four grades: arteriole, terminal arteriole, precapillary arteriole and capillary. The subpleural pulmonary capillaries generally came from the subpleural precapillary arteriole and communicated each other to form the subpleural pulmonary capillary network. Sometimes, the subpleural terminal arteriole directly gave rise to capillaries to unite with the subpleural pulmonary capillary network. The network was loose, in which the diameter of the mesh was larger than that of the capillary, and the mesh was often hexagon and pentagon in appearance. There were obvious imprints of the smooth muscles oil the surface of the casts of the subpleural pulmonary arteriole, the terminal arteriole and the precapillary arteriole. On the surface of the casts of the subpleoral pulmonary capillary. there were obvious imprints of the endothelial nuclei as well. In

addition, the broad and different level communications were found among the pulmonary interstitial capillary and subpleural pulmonary microvasculature. Conclusion There were no significant differences on the architecture of the subpleural pulmonary microvasculature between the Bactrian camel and other kind of mammals.
Descriptors: Bactrian camels, lungs, subpleural microvascular structures, scanning electron microscope methods, arteriole, terminal arteriole, precapillary arteriole, capillary, functional relationships, similar to other mammals.

Fan HongBo; Hasisurong; Jirimutu. **Separation and purification of IgG in Bactrian camel colostrum and its transfer to newborn camel calves**. *Veterinary Science in China*. 2006; 36(3): 220-224. ISSN: 1673-4696. Note: In Chinese with an English summary.
URL: http://www.zgsykx.com/
Abstract : The concentration of IgG in the colostrum of Bactrian camels in Alax and in the serum of camel calves were measured to determine the factors affecting the passive immunity of calves obtained from maternal antibodies. The whey proteins were fractionated by precipitation using saturated ammonium sulfate twice and the milk IgG was purified by the anion exchange resin DEAE-Sephacel. The purity and molecular weight of IgG were determined by SDS-PAGE. Specific rabbit anti-camel antiserum was prepared by injecting camel IgG to rabbits. The quantitative single radial immunodiffusion technique was used for the determination of colostrum IgG levels in Bactrian camels and serum IgG levels in calves at 90 and 14 days after parturition, respectively. The results highlighted the pattern of passive immunity of the calves obtained from maternal antibodies, and provided a foundation for better husbandry practice in camel industry.
Descriptors: Bactrian camels, camel calves, newborn immunity, colostral immunity, colostrum, IgG, maternal antibodies, maternal immunity, passive immunity, Vitelline immunity.

Jensen, JM. **Camelid drug formulary.** Published by Game Ranch Health , San Antonio, TX. 2006; (1st Ed.): 405 pp. ISBN: 9781424312177
Abstract: The book is divided into two main sections, the first dealing with South American Camelids (SAC), llama (*Lama glama*), alpaca (*Lama pacos*), guanaco (*Lama guanicoe*), and vicuna (*Vicugna vicugna*), and the second with dromedaries (*Camelus dromedaries*) and Bactrian camels (*C. bactrianus*). The drugs are grouped in the book according to clinical application (for example, Analgesia, Anaesthesia, Gastrointestinal, Immunization, Reproductive, Vitamins-Minerals). The information consists of a table with five columns entitled Drug, Species, Dosage, Comments, and Reference. For example the information for penicillin in the Reproduction - SAC section is: Drug: penicillin, Species: SAC, Dosage: 22,000 mg/kg, SC, q24h for 3 treatments, Comments: prevention of uterine infection, References: Johnson, L. 1989 [the full references are listed at the end of each of the SAC and Camel sections]. This book will be extremely useful to all veterinarians who come across camelids in their work. Reproduced with permission of CAB.
Descriptors: camelids, dromedary camels, Bactrian camels, llamas, alpacas, guanacos, vicunas, antibiotics, anti-infective agents, anti-inflammatory agents, anti-parasitic agents, medicines, drugs, drug therapy, anesthetics, vaccines, pharmacology, dosages, etc.

Madany, J; Nowakowski, H; Pepiak, A; Pasko, S. **Uveitis anterior in a camel - the clinical case**. *Bulletin of the Veterinary Institute in Puawy.* 2006; 50(1): 131-135. ISSN: 0042-4870

Abstract: The characteristics, diagnosis, clinical signs and treatment of uveitis in a circus Bactrian camel in Poland are described. Moderate uveitis anterior of traumatic origin in the camel is proof of possible uveitis occurrence in a species other than cats, dogs and horses in which the disease is most often observed.

Descriptors: Bactrian camels, circus animal, uveitis, eye trama, case reports, clinical aspects, diagnosis, therapy, therapeutics, Poland.

Madany, J; Nowakowski, H; Pepiak, A; Pasko, S. **Uveitis in a camel - a clinical case.** *Annales Universitatis Mariae Curie Skodowska Sectio DD, Medicina Veterinaria* . 2006; 61: 87-93. ISSN: 0301-7737. Note: In English with a Plish summary.

Abstract: Inflammation of the uveal tract (anterior or posterior uveitis) is a serious disease of the eye, leading to blindness [Poland, date not given]. A clinical case of uveitis in a circus camel was presented. The camel showed depression, anorexia and alteration in the right eyeball. After clinical examination, the diagnosis of anterior uveitis of the right eyeball and swelling of the nasal area was stated which could be due to mechanical trauma. The therapeutic course was described. The drugs given to the animal included atropine, tolfenamic acid, prednisolone and dimethyl sulfoxide. Telephone reports confirmed that the animal recovered completely after the treatment. Moderate anterior uveitis of traumatic origin in a camel was proof of the possible occurrence of uveitis in breeds different from cats, dogs and horses.

Descriptors: Bactrian camel, uveitis, eye infections, trauma, blindness, case report, clinical aspects, atropine, dexamethasone, diagnosis, dimethyl sulfoxide, drug therapy, eye hemorrhage, eye inflammation, neomycin, polymyxin B, prednisolone, prognosis.

Mosaad, AA; Elbagory, AR; Khalid, AM; Waters, WR; Tibary, A; Hamilton, MJ; Davis, WC. **Identification of monoclonal antibody reagents for use in the study of the immune response to infectious agents in camel and water buffalo.** *Journal of Camel Practice and Research.* 2006; 13(2): 91-101. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Progress in elucidating the mechanisms regulating the immune response to infectious agents and derived vaccines in domestic species, especially in camels and water buffaloes, has been impeded by the lack of monoclonal antibody (mAb) reagents needed to study the immune response in the species of interest. As a first step to address this problem, we conducted a study to determine how many existing mAbs developed against leukocyte differentiation molecules (LDM) in various species recognize conserved epitopes on orthologous (identical) molecules in two or more species of Artiodactyla. Analysis of 490 monoclonal antibodies raised against LDM in cattle, goat, sheep, llama, pig, dog and human revealed that many epitopes have been conserved on orthologous molecules in the course of evolution in closely related species in the suborder Ruminantia such as in cattle, bison and water buffalo, and fewer on more distantly related species such as goat and sheep. Only a few of the epitopes conserved in Ruminantia were conserved in the suborders Suiformes (pigs) and Tylopoda (llamas and camels). The highest level of conservation in all suborders was found with major histocompatibility complex (MHC) class I (MHC I) and class II (MHC II) molecules. These findings show the potential as well as the limitations of screening

existing mAbs for research in less use studied species. Importantly, the findings also provide further insight into the composition of the immune system in Artiodactyla and factors to be considered when studying the immune response to infectious agents and vaccines in the different suborders of Artiodactyla. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, bison, buffaloes, cattle, dogs, goats, llamas, humans, rabbits, pigs, sheep, epitopes, evolution, immune response, immune system, immunity, major histocompatibility complex, monoclonal antibodies, antigenic determinants, histocompatibility complex, immunological reactions.

Mosaferi, S; Niasari Naslaji, A; Bahmani, N; Gharahdaghi, AA; Abarghani, A; Ghanbari, A; Gerami, A. **Comparing different levels of osmolality of sucrose extender on the viability of spermatozoa in Bactrian camel (*Camelus bactrianus*).** *Reproduction Fertility and Development.* 2006; 18(1-2): 160. ISSN: 1031-3613. Note: 32nd Annual Conference of the International Embryo Transfer Society, Orlando, FL, USA; January 07-11, 2006
URL: http://www.worldcat.org/issn/1031-3613
Descriptors: Bactrian camels, sperm preservation, viscosity, osmolality, sperm viability, forward motility testing, sucrose extender.

Muhammad, G; Jabbar, A; Iqbal, Z; Athar, M; Saqib, M. **A preliminary passive surveillance of clinical diseases of cart pulling camels in Faisalabad metropolis (Pakistan).** *Preventive Veterinary Medicine.* 2006 Oct 17; 76(3-4): 273-279. ISSN: 0167-5877
DOI: http://dx.doi.org/10.1016/j.prevetmed.2006.05.006
NAL call no : SF601.P7
Descriptors: male, Bactrian camels, animal drawn vehicles, draft camels, disease surveillance, animal disease incidence, disease diagnosis, scabies, *Sarcoptes scabiei*, arthropod pests, skin diseases, surra, *Trypanosoma*, thermoregulation, anhidrosis, Pakistan.

Niasari Naslaji, A; Mosaferi, S; Gharahdaghi, AA; Abarghani, A; Ghanbari, A; Gerami, A; Bahmani, N. **Comparison between two extenders for cryopreservation of Bactrian camel semen.** *Reproduction Fertility and Development*. 2006; 18(1-2): 161. ISSN: 1031-3613. Note: "32nd Annual Conference of the International-Embryo-Transfer-Society, Orlando, FL, USA; January 07 -11, 2006."
URL: http://www.worldcat.org/issn/1031-3613
Descriptors: Bactrian camel, camel semen preservation, cryopreservation techniques, diluents, glucose, citric acid, fructose, SHOTOR diluent.

Niasari Naslaji, A.; Mosaferi, S; Bahmani, N.; Gharahdaghi, AA; Abarghani, A; Ghanbari, A; Gerami, A. **Effectiveness of a tris-based extender (SHOTOR diluent) for the preservation of Bactrian camel (*Camelus bactrianus*) semen**. *Cryobiology*. 2006; 53(1): 12-21. ISSN: 0011-2240
URL: http://www.sciencedirect.com/science/journal/00112240
Abstract: The development of a suitable semen extender is required to extend artificial breeding programs and to preserve the genetic potential of Bactrian camel. Experiments were conducted to provide the optimal osmolality and pH of tris-based extender and to compare that with available extenders for short-term preservation of Bactrian camel semen at 4 degrees

C during 24 h. In experiments I and 11, the effects of varying osmolalities (270, 300, 330, 360, and 390 mOsm/kg) and pHs (5.5, 6, 6.9, 7.5, 7.9, and 8.9) of tris-based extender on sperm viability were investigated. In experiment 111, the efficiency of tris-based extender (SHOTOR diluent) in preserving Bactrian camel semen was compared with lactose (10%), sucrose (10%) and Green buffer. Viability parameters including progressive forward motility (PFM), plasma membrane integrity and the percentage of live spermatozoa were assessed. The data were analyzed using general linear model procedure. In the majority of assessments using tris-based extender, the viability of spermatozoa, was superior at the osmolality of 330 mOsm/kg and pH of 6.9. PFM was significantly greater at the time of semen dilution in tris-based (65.5%) and Green buffer (60.5%) compared to that of lactose (31%) and sucrose (28%) extenders ($P < 0.05$), and remained elevated throughout the experiment. There was no significant difference in other viability parameters among 4 extenders ($P > 0.05$). In conclusion, the utilization of a tris-based extender, having the osmolality of 330 mOsm/kg and pH of 6.9, favors the short-term preservation of the Bactrian camel spermatozoa under chilled condition.
Descriptors: Bactrian camel, semen, tris-based semen extender, artificial breeding programs, preserving genetic potential, viability parameters, pH, osmolality, progressive forward motility, lactose, sucrose.

Niasari Naslaji, A; Mosaferi, S; Bahmani, N; Abarghani, A; Gharahdaghi, AA; Gerami, A. **Effect of lactose extender with different levels of osmolality and pH on the viability of Bactrian camel (*Camelus bactrianus*) spermatozoa.** *Iranian Journal of Veterinary Research.* 2006; 7(4): 14-22. ISSN: 1728-1997. Note: In English with a Perisan summary.
URL: http://www.shirazu.ac.ir/en/index.php?page_id=60
Abstract: Semen was collected from 10 Bactrian camel bulls using modified bovine artificial vagina. In experiment I, the extenders used were 9, 10, 11, 12 and 13% lactose with osmolalities of 290, 333, 350, 376 and 419 mOsm/kg, respectively, at pH 6.9. In experiment II, the 10% lactose extender subjected to different pH (5.9, 6.9, 7.5, 7.9 and 8.9) were compared. All extenders contained 20% egg yolk and antibiotics. There were three replicates (ejaculates) for each trial. After dilution, semen was evaluated for progressive forward motility (PFM), plasma membrane integrity (PMI) and live percentage of sperm at 0, 4, 12 and 24 h after incubation at 4 degrees C. Viability of sperm was similar in 9, 10 and 11% lactose concentrations at 0 and 4 h. PFM was affected (<8%) at 10 and 11% lactose extenders at 12 h. PFM was highest at 0 h ($P<0.05$) at pH 6.9, but decreased by 15% at 4 h ($P<0.05$). At pH 5.9-7.9, PMI and live percentage of sperm decreased at 12 and 24 h, respectively ($P<0.05$). It is concluded that semen with 9, 10 and 11% lactose at pH 6.9 is the suitable extender for short-term preservation (up to 4 h) of Bactrian camel semen maintained at 4 degrees C. Reproduced with permission of CAB.
Descriptors: Bactrian camels, sperm, sperm motility, sperm viability, cryopreservation, lactose, osmotic pressure, pH, plasma membranes, semen diluent additives, semen diluents, spermatozoa, cell membrane, milk-sugar; plasmalemma.

Odbileg, R; Purevtseren, B; Batsukh, Z; Konnai, S; Ohashi, K; Onuma, M. **Complete cDNA sequences and phylogenetic analyses of the Th1 and Th2 cytokines of the Bactrian camel (*Camelus bactrianus*).** *Journal of Veterinary Medical Science*. 2006; 68(9): 941-946. ISSN:

0916-7250
URL: http://www.soc.nii.ac.jp/jsvs
DOI: http://dx.doi.org/10.1292/jvms.68.941
Abstract: The complementary DNAs of the Th1 (IL-2, IL-12p35, and IFN- gamma) and Th2 (IL-4, IL-10 and IL-13) cytokine genes of the Bactrian camel (*Camelus bactrianus*) were cloned, sequenced, and analyzed. IL-2, IL-4, IL-10, IL-12p35, IL-13, and IFN- gamma were found to have 465, 402, 537, 669, 411, and 501 bp length open reading frames with 154, 133, 178, 222, 136, and 166 amino acid encodings, respectively. The homology ranged from 58.8% to 100% between the nucleotide sequences of the camel cytokine genes and the published sequences of other mammalian genes, including the llama, pig, cow, horse, human, and mouse. The cDNA had highest homology with orders Artiodactyla (pigs and cattle) and Perissodactyla (horses), especially to the recently cloned llama sequences. Reproduced with permission of CAB.
Descriptors: Bactrian camel, pigs horses, cattle llamas, complementary DNA, cytokines, DNA cloning, interferon, linkage, genes, nucleotide-sequences, open reading frames, phylogeny, ORFs.

Richter, T. **Durchtrittigkeit beim Trampeltier (*Camelus ferus bactrianus*), der orthopadische Schuh, ein Therapieansatz.[Hyperextension of the fetlock in *Camelus bactrianus* - the therapeutic use of the orthopaedic shoe.]** *Tierarztliche Umschau.* 2006; 61(4): 216-217. ISSN: 0049-3864. Note: In German with an English summary.
URL: http://www.tu-online.de/
Descriptors: Bactrian camel, lameness, musculoskeletal disorders, hyperextenion of fetlock, phalanges structure, orthopedic shoe as treatment.

Sabocanec, R; Grabarevic, Z; Seol, B; Bedrica, L; Gudan, A; Dzaja, P; Vitkovic, K; Curic, S; Ancic, Z. **Clostridiuminfektion bei einem zweihockrigen Kamel (*Camelus bactrianus)* im Zagreber Zoo. [Clostridiosis in two humped camels (*Camelus bactricanus*) in Zagreb Zoo.]** *Tierarztliche Umschau*. 2006; 61(6): 322-328. ISSN: 0049-3864. In German with an English summary.
URL: http://www.tu-online.de/
Abstract: A case of peracute clostridiosis in a 7-year-old two-humped camel (*Camelus bactrianus*) maintained at Zagreb Zoo is described (Croatia, date not given). Pathological and bacteriological examinations were conducted. The animal died suddenly, overnight, without any clinical signs. It was kept with two other camels which have not shown any disease signs. Gross lesions included degeneration of the myocardium with sub-epicardial ecchymoses, haemorrhage of the pharynx and larynx, severe nephrosis and haemorrhagic abomasoenteritis. All the organs were examined histologically. Bacteriological examination of the intestine and lung specimens revealed *Clostridium perfringens.*
Descriptors: Bactrian camel, case report, peracute clostridiosis, clinical finding, autopsy, post mortem examinations, *Clostridium perfringens*, bacterial infection, bacterial diseases, diagnosis, zoo animals, Croatia.

Wernery, U. **Camel milk, the white gold of the desert.** *Journal of Camel Practice and Research.* 2006; 13(1): 15-26. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: New World camelids are not milked, but the milk of Old World camelids is being used for many centuries. The two-humped camel lives in cold climate, hence their milk fat can reach levels of 8% which serves as an energy source for the newborn. The one-humped camel lives in hot climatic zones, hence the fat content is low, but the water content is high. The camel udder possesses 4 quarters, one teat per quarter and 2 teat canals per teat, sometimes even 3. One of the most remarkable features of dehydrated camels is the ability to continue lactation and to secrete milk that is highly diluted with over 90% water content. A temperamental camel cow which does not like or know its milker will simply cease production, but a contented camel can produce milk for a very long period. Globally, the milk productivity of camels is more than 5 times lower than the milk productivity of cattle. The camel's mammary gland possesses at least 8 (4x2) independent milk units. The camels are milked by hand. A pilot camel milking project using bucket milking machines began at CVRL in 2001. A modern camel dairy farm with the intention of milking several hundred dromedaries will be opened in autumn 2006 in Dubai under the name Dubai Camel Dairy Farm (DCDF). Mastitis in camels is rare. Treatment of camel mastitis is carried out parenteral due to the narrow teat canals. No bacteriological standards exist for raw and pasteurized camel milk. Transformation from colostrum to normal milk is reached after 7-10 days. The colostrum of camels is white like normal milk. Duration of milk letdown is very short, about one to two min, therefore milking from both sides is essential. Camels should be milked several times a day. Good milkers can produce 20-30 litres daily. Camel milk is a rich source of proteins with potential antimicrobial and protective activity. Components of camel milk differ considerably from those of ruminants and have strong similarities to those of human. Camel fat contains a higher concentration of long chain fatty acids (C14-C18) than short chain fatty acids, and is therefore healthier. Camel milk contains less vitamin A, B< sub>2</ sub> folic acid and pantothenic acid than cow milk. On the contrary, the content of niacin and vitamin C is remarkably higher than in cow milk. The high concentration of vitamin C and the high water content are the most eminent factors of camel milk. Whey proteins in camel milk are more heat resistant than those of cow milk. The degree of denaturation varies in camel milk from 32 to 35% at 80 degrees C. In cow milk, 70-75% of whey proteins are denatured at this temperature. Pasteurization at 72 degrees C for 5 min reveals only 5-8% losses of camel milk composition investigated. Lactation periods of up to 24 months are known to occur in dromedaries. Camel milk proteins are different to that of cow milk. This may be the reason why no allergies to camel milk proteins are known. Camel milk does not coagulate easily. It passes the acidic stomach undisturbed and reaches the intestines for absorption. Camel milk contains 5 times more vitamin C compared to cow milk. Camel milk contains insulin and is therefore used to treat diabetes mellitus. Camel milk contains medicinal properties to treat different ailments such as autoimmune diseases, allergies, asthma, rash, diabetes, infectious diseases like tuberculosis, stress, peptic ulcers and cancer. It is a booster of the immune system. Camel milk products are consumed commercially as fresh, raw or pasteurized milk and cheese, especially soft cheese in West Africa (caravane made in Mauritania), ice creams with different flavours, milk shakes, puddings (creme brulee and panna cotta), Arabian dish mohabila and susa (North-Eastern Africa) or shubat (Kazakh-

stan) as sour milks. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, lactating camels, milking, camel milk, milk composition, colostrum, medicinal properties, milk products, milk proteins, milk quality, antibacterial properties, fat, fatty acids; immunoglobulins, gamma gabulins, lactoferrin; lactoperoxidase, lysozyme; N acetyl beta glucosaminidase, nicotinic acid, vitamins, whey protein, bactericidal properties, pasteurization, denaturation, heat treatment mammary glands, mastitis, *Arcanobacterium pyogenes,Escherichia coli*, *Pasteurella multocida*, *Staphylococcus aureus*, *Streptococcus agalactiae*.

Wu Run; Chen HaoTai; Liu XiangTao; Xie QingGe. **Prokaryotic expression of recombinant prion proteins of domestic yak and *Camelus bactrianus*.** *Veterinary Science in China.* 2006; 36(1): 1-6. ISSN: 1673-4696. Note: In Chinese with an English summary.
URL: http://www.zgsykx.com/
Abstract: The aim of this study is to compare the prokaryotic expression of the recombinant prion proteins in domestic yak and *C. bactrianus*. Using recombinant DNA technology, four expression plasmids from the yak and *C. bactrianus* were constructed namely: pGEX-BoPrP(23-242), pGEX-BoPrP(100-242), pGEX-CaPrp(25-241) and pGEX-CaPrp(93-241). After transforming *E. coli* BoPrp(23-242), *E. coli* BoPrP (100-242), *E. coli* CaPrp(25-241) and **E. coli** CaPrP(93-241) were obtained. While the recombinant bacteria was induced by 1.0 mmol/L by IPTG at 37 degrees C for 5 to 6h, the expected fusion protein with a molecular size of 50.2 ku, 41.7 ku, 49.9 ku and 42.4 ku were produced, respectively and the expression products accounted for 30-25% overall bacterium protein. Western blot analysis confirmed that the fusion proteins, GST-BoPrP(23-242), GST-CaPrP(25-241) and GST-CaPrP(93-241) could react with the anti-bovine PrP monoclonal antibodies at 4C11 with the exception of GST-BoPrP(100-242). Results showed that the yak PrP and the camel PrP shared the same antigen component which is also present in the Prp of Yellow cattle. Reproduced with permission of CAB.
Descriptors: Bactrian camels, yaks, *Escherichia coli*, antigens, chromosome maps, gene expression, monoclonal antibodies, plasmids, prion proteins, fusion proteins, gene sequences, immunogens, recombinant proteins, China.

Xie ZhaoHui; Li HaiYan; Wang JianLin. **Morphological study on the cerebrum of Bactrian camel (*Camelus bactrianus)* with particular reference to sulci.** *Journal of Camel Practice and Research.* 2006; 13(1): 61-66. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The macroscopic anatomy of the cerebrum of the Bactrian camel (*Camelus bactrianus*) was reported for the first time. Many features varied significantly from most previously described ungulate species including its large size, sulci pattern of the cerebral hemispheres and well-developed sular cortex. Six brains of adult Bactrian camels were examined, and the mean values of the cerebrum length, width and height were 11.23, 8.67 and 5.77 cm, respectively. The mean weights of the brain (518.3 g) and the sulci of the cerebrum, in general, were similar to that of the Chinese Qin-tibetan yak and Chinese water buffalo. The Bactrian camel had large temporal lobes, well-developed olfactory bulbs and prominent sulci and gyri. The results were beneficial for further research on the comparative neuroanatomy and developmental neurology. Reproduced with permission of CAB.

Descriptors: Bactrian camel, yak, Chinese water buffalo, camel-anatomy, camel brain morphology, cerebrum, morphometrics.

Zhao, M; Willms, WD; Han, G; Jin, Y. **Bactrian camel foraging behaviour in a *Haloxylon ammodendron* (C.A. Mey) desert of Inner Mongolia** .*Applied Animal Behaviour Science.* 2006 Sept; 99(3-4): 330-343. ISSN: 0168-1591
URL: http://dx.doi.org/10.1016/j.applanim.2005.11.001
NAL call no: QL750.A6
Descriptors: Bactrian camels, *Camelus bactrianus ferus,* foraging, food plants, *Haloxylon ammodendron*, foraging behavior, *Agriophyllum squarrosum* feeding preferences, feed intake, rumination, diurnal variation, seasonal variation, desert animals, deserts, China.

Zhao MengLi; Willms, WD; Han GuoDong; Jin Ye **Bactrian camel foraging behaviour in a *Haloxylon ammodendron* (C.A. Mey) desert of Inner Mongolia.** *Applied Animal Behaviour Science.* 2006; 99(3/4): 330-343. ISSN: 0168-1591
URL: http://www.sciencedirect.com/science/journal/01681591
Abstract: The Bactrian camel (*Camelus bactrianus ferus*) is uniquely adapted to the deserts of China and Mongolia. It was domesticated about 3000 years ago but the wild Bactrian camel is endangered with less than 1000 remaining in China. We observed the foraging behaviour of 10 domestic Bactrian camels (Alashan) in a *Haloxylon ammodendron* C.A. Mey desert of Inner Mongolia. The Alashan Bactrian camel is one of about four breeds of the species found in the western part of Inner Mongolia. In each season, plant species selection was observed for each camel over three, 10-min periods at morning, noon and night and their primary activities were recorded over a period of 17.6, 19.2, 18.5, and 17.2 h in winter, spring, summer and autumn, respectively. Forage intake was estimated by mimicking bite size for each species and extrapolating to the total time spent grazing. Plant species preferences were calculated from estimates of their relative utilization and availability. The number of species contributing to the camels' diet in winter, spring, summer, and autumn were 5, 6, 7, and 8, respectively. No seasonal differences ($P<0.05$) were detected in forage intake, faecal output, or apparent digestibility. The Bactrian camels switched their diet from a senesced forb, *Agriophyllum squarrosum* (L.) Moq., in winter to the shrub *H. ammodendron* in spring, and to an increasing dependence on perennial and annual herbaceous species in autumn. *H. ammodendron* was the dominant species in this desert community and was utilized in each season. Camels are dependent on a yearlong forage supply from a fragile environment, which can readily be damaged without careful management.
Descriptors: Bactrian camels, camel behavior, arid lands, deserts, foraging, grazing, forage, feeding behavior, food intake, camel food preferences, digestibility, food intake, *Haloxylon ammodendron*, Mongolia.

Zhou HuanMin; Guo ZhenHua. **Heterogeneous nuclear transfer embryos reconstructed by bovine oocytes and camel (*Camelus bactrianus)* skin fibroblasts and their subsequent development.** *In Vitro Cellular and Developmental Biology Animal.* 2006; 42(1/2): 16-19.
URL: http://www.sivb.org/pubs_a_index.asp
DOI: http://dx.doi.org/10.1290/0506038.1
Abstract: This study reconstructed heterogeneous embryos using camel skin fibroblast cells

as donor karyoplasts and the bovine oocytes as recipient cytoplasts to investigate the reprogramming of camel somatic cell nuclei in bovine oocyte cytoplasm and the developmental potential of the reconstructed embryos. Serum-starved skin fibroblast cells, obtained from adult camel, were electrically fused into enucleated bovine metaphase II (MII) oocytes that were matured in vitro. The fused eggs were activated by Inomycin with 2 mM/ml 6-dimethylaminopurine. The activated reconstructed embryos were cocultured with bovine cumulus cells in synthetic oviduct fluid supplemented with amino acid (SOFaa) and 10% fetal calf serum for 168 h. Results showed that 53% of the injected oocytes were successfully fused, 34% of the fused eggs underwent the first egg cleavage, and 100% of them developed to four- or 16-cell embryo stages. The first completed cleavage of xenonuclear transfer camel embryos occurred between 22 and 48 h following activation. This study demonstrated that the reconstructed embryos underwent the first embryonic division and that the reprogramming of camel fibroblast nuclei can be initiated in enucleated bovine MII oocytes.
Descriptors: *Camelus bactrianus* , Bactrian camel, cattle, embryo culture, embryo transfer, embryonic development, cleavage cytoplasm, fibroblasts, in vitro culture, metaphase, oocyte maturation, skin cells, somatic cells, reconstructed embryos.

Zhou HuanMin; Guo ZhengHua. **Heterogeneous nuclear-transferred-embryos reconstructed with camel (*Camelus bactrianus*) skin fibroblasts and enucleated ovine oocytes and their development H M.** *Animal Reproduction Science.* 2006; 95(3/4): 324-330. ISSN: 0378-4320
DOI: http://dx.doi.org/10.1016/j.anireprosci.2006.01.015
NAL call no: QP251.A5
Abstract: This study reconstructed heterogeneous embryos using camel skin fibroblast cells as donor karyoplasts and ovine oocytes as recipient cytoplasts for investigating the developmental potential of the reconstructed embryos. Serum-starved adult camel skin fibroblast cells were used as donor somatic cells. Ovine oocytes matured in vitro were employed as recipient cytoplasts. The fusion of fibroblast cells into recipient cytoplasm was induced by electrofusion. The fused oocytes were activated by 5 mM/ml inomycin with 2 mM/ml 6-dimethylaminopurine (6-DMAP). The activated reconstructed embryos were co-cultured with ovine cumulus cells in synthetic oviduct fluid supplemented with amino acid (SOFaa) and 10% fetal calf serum (FCS) for 168 h. A total of 300 enucleated ovine oocytes were available for xenonuclear embryo reconstruction. The results showed that 71% of the nuclear transfer couplets were successfully fused, 55% of the fused oocytes cleaved within 48 h after activation, 82% of the cleaved oocytes developed to 2-16-cell embryo stages and 18% of the cleaved nuclear transfer zygotes developed to the morula stage. This study demonstrated that the xenonuclear transfer camel embryos can undergo the first embryonic division and subsequent development to morula stage in vitro.
Descriptors: Bactrian camels, sheep, oocytes, zygotes, heterogeneous embryos, embryonic development fibroblasts, cell culture; cytoplasm, embryo transfer, karyoplast morula.

2005

Al Ani, FK; Roberson, J. **Fungal infection of camelids.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 70-84. ISBN: 1586034731

Descriptors: camelids, bactrian camels, dromedary camels, fungal infections, clinical aspects, etiology, aflatoxicosis, aflatoxin poisoning, European blastomycosis, aspergillosis, candidosis, candidiasis, cryptococcosis, dermatomycoses, ergotism, lymphangitis, mycoses, mycotoxicoses, mycotoxins, fungal toxins, dermatophytes, sporotrichosis, zygomycosis, fungal morphology, diagnosis diagnostic techniques, disease control, disease prevention, drug therapy, epidemiology, defence mechanisms, geographical distribution, histopathology, natural immunity, pathogenesis, pathogenicity, taxonomy, antifungal agents, iodine, ceratocide, amphotericin B, antifungal agents, azoles, griseofulvin, imidazoles, nystatin, causal agents *Ajellomyces capsulatus*, *Aspergillus,Candida albicans*, *Claviceps purpurea*, *Conidiobolus coronatus*, *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Microsporum*, *Neotyphodium coenophialum*, *Neotyphodium lolii*, *Rhizopus*, *Sporothrix schenckii*, *Trichophyton*, *Acremonium coenophialum*, *Acremonium lolii, Hyphomycetes,*

Chen, Y; Wu, YJ; Xu, BL; Wan, J; Qian, ZM. **Species-specific polymerase chain reaction amplification of camel** *(Camelus***) DNA extracts.** *Journal of AOAC International*. 2005 Sept-Oct; 88(5): 1394-1398. ISSN: 1060-3271

Abstract: A sensitive polymerase chain reaction (PCR) method based on amplification of a specific DNA fragment was established for the identification of camel (*Camelus*) materials. The species-specific primer pair L183/H372 was designed based on the nucleotide sequence of the mitochondrial cytochrome b gene, and its specificity was confirmed by amplification of 3 camel (domestic double-humped camel, wild double-humped camel, wild one-humped camel) samples and 11 non-*Camelus* animal (sheep, goat, pig, chicken, cattle, fish, dog, horse, donkey, deer, and rabbit) materials. An expected 208 base pair fragment was amplified from camel materials; no cross-reactive or additional fragments were generated from other animal materials. Taq I restriction endonuclease digestion of the unpurified PCR product can be used routinely to confirm the camel origin of the amplified sequence.

Descriptors: *Camelus* , wild dromedary camels, domesticated Bactrian camels, wild Bactrian camels, camel meat, product authenticity, DNA, polymerase chain reaction, PCR, nucleotide sequences, cytochrome B, meat and bone meal, molecular sequence data.

Faye, B; Esenov, P (Editors). ***Desertification Combat andFood Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.*** IOS Press, Amsterdam. 2005; 225 pp.

Abstract : This book gives an overview of the status of camel production, development of camel products and maintenance of animal productivity in order to satisfy human requirements both in quantity and quality. The workshop contributes to the exchange between scientists in order to allow access to new approaches and methodologies by all desert and camel scientists in the involved countries (Western European countries, Mediterranean countries and Central Asian Republics). The 4 papers presented in the plenary sessions discuss the

new trends in camel sciences, desertification in Central Asian countries, Arvana breed camel and the association between camel and society. A total of 14 papers give emphasis on desertification, selection, breeding and diseases of camels. Camel keeping and productiveness are discussed in 16 papers. Moreover, recommendations are given. Reproduced with permission of CAB.
Descriptors: desertification, desert animals, domestication, dromedary camels, Bactrian camels, camel production, pasteurizing, grazing behaviors, reproductive performance, selective camel breeding, camel genetic resources, camel-based products, camel milk production, camel milk composition, camel milk products, sour milk, lactoferrin, leptin, lipids, fiber products, fleece, wool, adipocytes, disease prevention, infectious-diseases, mycoses, probiotics, therapy.

Faye, B. **Productivity potential of camels.** In: B. Faye and P. Esenov (Editors) . *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 127-134. ISBN: 1586034731
Abstract: It is accepted that camel has the ability to produce more milk than cow in similar conditions. However, the camel milk productivity is not well known. Data from the literature are scarce and mainly from observations in research stations. Data are more rarely from pastoral areas, where performance monitoring is uncommon. Elsewhere, the data are not homogeneous from one author to another with regards to mean daily yield, total yield per lactation and herd average. Therefore, the comparisons are not easy. Furthermore, there is a high variability of reported productions, which leads to suppose a potential for the selection on that criterion. This selection is possible but rarely achieved except in Soviet Union for dromedary and Bactrian camels. The world production of camel milk is officially estimated to be 1.3 million tonnes in 2002. However, according to the high level of self-consumption and of the individual potential, this production can probably be higher (i.e. 5.4 millions tonnes). The individual production varies between 1000 and 12000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is quite variable (from 8 to 18 months in general), but longer than that for dairy cattle in similar conditions. The feeding and seasonal conditions have an impact on performance. Some intensified systems occurring in many places showed good prospects in camel milk production to supply populations from arid lands.
Descriptors: dromedary camels, Bactrian camels, camel milk, dairy performance, lactation curve, lactation duration, milk consumption, milk production, milk supply, milk yield, seasonality, selection, genetic variation, genotypic variability, Africa, Asia.

Faye, Bernard; Esenov, P (Editors). ***NATO Advanced Research Workshop on Desertification Combat and Food Safety (2004 : Ashkhabad, Turkmenistan).*** IOS Press, Amsterdam; Washington, DC: c2005. Note: NATO science series. Series I, Life and behavioural sciences, 1566-7693; v. 362. ISBN: 1586034731. "Proceedings of the NATO Advanced Research Workshop on Desertification Combat and Food Safety, 19-21 April 2004, Ashgabad, Turkmenistan". Contents: Camel and desert : new trends of the camel sciences / Bernard Faye; Desertification in the Central Asian countries / I.S. Zonn; Camels of the Arvana breed : history, modern state, and perspectives for the development / B. Sopyev, G. Saparov, and O. Annamukhammedov; The camel and society / Franethcois Brey and Bernard Faye;

Camel : history of its domestication / H. Yusupov; Participatory approaches to using the camel in combating desertification / Ilse Kohler-Rollefson and Hanwant Sing Rathore; The current status of the wild Bactrian camel / John Hare; Environmental education and public awareness : valuable tools in combating desertification / Kathryn Rae; Desertification and camel-breeding in Kalmykia (Russian Federation) / E. Gabunshchina and L. Dzhabrueva; Realization of the National Action Program to Combat Desertification in Turkmenistan / Muhamet Durikov and Jamal Annaklycheva; Diseases of camels, their preventive maintenance and treatment / B. Sopyev, B. Divanov, and C. Charyev; The most important infectious diseases in camelids / U. Wernery; Fungal infections of camelids / Falah K. Al-Ani and Jerry Roberson; Role and method of advising for producers in natural hardship conditions / Murat Aitmatov .. [et al.]; Factors affecting reproductive performance of camels at the herd and individual level / Ahmed Tibary, Abdelhaq Anouassi, and Abdelmalek Sghiri; Assisted reproduction in dromedary camels / J.A. Skidmore and M. Billah; Camel genetic resources and ways of camel breeding products use for population of Kazakstan arid areas / A. Tasov and N. Alybaev; Productivity potential of camels / Bernard Faye; Body lipids and adaptation of camel to food and water shortage : new data on adipocyte size and plasma leptin / Y. Chilliard .. [et al.]; Standards for camel milk / Uzi Merin .. [et al.]; Modern dairy products from traditional camel herding : an experience in Mauritania / Nancy Abeiderrahmane; Lactoferrin of camel milk of Kazakhstan / G. Konuspayeva .. [et al.]; -- Artificial nursing of camel calves : an effective technique for calves' safeguard and improving herd productivity / T. Khorchani, M. Hammadi, and M. Moslah; Camel dairy in eastern Africa : present state and future perspectives / Zakaria Farah and Mario Younan; Influence of feeding on camel milk components / Donata Cattaneo .. [et al.]; -- Probiotic properties of a sour-milk product : shubat from the camel milk / A. Serikbayeva .. [et al.]; The effectiveness of the people treatment with camel chal / T. Khodzhageldyev and B.G. Khodzhakuliyev; Development of products for child nutrition and for medical and prevention purposes on the base of camel milk / Yuri Aleksandrovich Sinyavskiy; Camel milk production and transformation in Sub-Saharan Africa / Mohammed Bengoumi, Gilles Vias, and Bernard Faye; Pasture ration of Arvana camels in desert pastures / H. Khanchaev; Meat productivity of the camel Arvana breed and ways to increase it / G. Saparov and O. Annageldiyev; The milk productivity of the camel Arvana breed and its use / A. Cherzekov and G. Saparov; Wool productivity and quality of fleece in the camel Arvana breed / O. Annageldiyev, G. Saparov, and M. Atayeva. Reproduced with permission of CAB.

Gabunshchina, E; Dzhabrueva, L. **Desertification and camel-breeding in Kalmykia (Russian Federation).** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 49-54. ISBN: 1586034731

Descriptors: Bactrian camels, dromedary camels, desertification, adaptation to arid grasslands, animal-breeding, camels-based products, camel meat, camel milk, wool, Russia.

Gage, LJ; Vandenabeele, SIJ; White, SD. **Use of hyposensitization injections to control seasonal pruritus in a Bactrian camel (*Camelus bactrianus*).** *Journal of Zoo and Wildlife Medicine.* 2005; 36(1): 88-94. ISSN: 1042-7260

Abstract: A 9-yr-old, female Bactrian camel (*Camelus bactrianus*) developed severe pruritus

in June 1993. During the next 8 yr, the camel exhibited annual episodes of pruritus and epiphora, generally beginning in June and subsiding in October of each year. These signs could usually be controlled with topical agents and fly repellents, although pruritus flare-ups were effectively controlled with intermittent injections of diphenhydramine and corticosteroids. There were no signs during the colder months. The pruritus became more severe and difficult to control when the camel reached its 18th year. Histopathologic descriptions of skin biopsies taken from several sites suggested a hypersensitivity reaction with secondary changes because of bacterial infection or corticosteroid administration (or both). An intradermal test (IDT) performed using 62 allergens regionalized to Northern California resulted in 17 positive test sites. Hyposensitization therapy was initiated using allergens chosen on the basis of exposure, availability, and the results of the IDT, using standard protocols. The clinical signs of pruritus were markedly reduced in the 2 yr after the hyposensitization injections were initiated. Reproduced with permission of CAB.
Descriptors: Bactrian camel, zoo animal, case study, skin disease, severe pruritus, epiphora, itching, seasonal events, allergies clinical aspects, diagnosis, histopathology, hypersensitivity, immune desensitization, California, USA.

Hare, J. **The current status of the wild Bactrian camel.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 43-45. ISBN: 1586034731
Descriptors: Bactrian camels, wild camels, population decrease, predation, hunting, wild camel protection, adaptation, desertification, arid lands, habitat destruction, predation, Gobi Desert, Mongolia.

Liu, ZP. **Studies on rickets and osteomalacia in Bactrian camels (*Camelus bactrianus*).** *Veterinary Journal.* 2005 May; 169(3): 444-453. ISSN: 1090-0233
URL: http://www.sciencedirect.com/science/journal/10900233
NAL call no.: SF601.V484
Abstract: Epidemiological studies have indicated incidences of 32.9% and 27.8% for rickets and osteomalacia, respectively, in Bactrian camels (*Camelus bactrianus*), but there is an increased incidence under drought conditions, sometimes reaching 75%. We have found that concentrations of phosphorus and copper in forage and soil samples in a drought affected area were significantly lower than in a control area or normal reference values ($P < 0.01$); the mean Ca:P ratio in the forages was 50:1. The phosphorus content of blood and hair from affected camels was significantly less than that in controls ($P < 0.01$) and concentrations of copper in the liver and kidney were significantly lower in affected camels than control animals ($P < 0.01$); the concentrations of triiodothyronine (T3), thyroxine (T4) and parathyroid hormone (PTH) in the serum from affected animals were significantly higher than those from healthy controls ($P < 0.01$); serum inorganic phosphorus and ceruloplasmin levels were lower than those in the controls ($P < 0.01$ or $P < 0.05$); the concentrations of serum alpha-globulin and beta-globulin were significantly higher in the affected camels than in the healthy controls ($P < 0.01$). The pathological changes seen in camels affected with rickets included porous, brittle, light, osteoporotic bones that were susceptible to fractures and had less resistance to cutting and sawing. Wrist joints were enlarged with an apparent bowing of the long bones in forelimb and with typical broadening of the epiphyses. In adult female

camels, many enlarged scars were often seen in ribs indicating earlier fractures. The disease could be cured with supplementary bone meal, phosphate or mineral mixtures and in field investigations clinical signs disappeared within 15 days. Over the same period, the concentrations of phosphorus and alkaline phosphatase in blood returned to normal. The disease may be effectively prevented by use of mineral blocks (block salt licks) or dosing orally with copper, selenium and cobalt soluble glass boluses. We conclude that rickets and osteomalacia are mainly caused by phosphorus and copper deficiencies in the pasture.
Descriptors: Bactrian camels, animal diseases, pathophysiology, osteomalacia, rickets, disease incidence, epidemiology, drought, phosphorus, copper, forage, nutrient content, nutritive value, nutrient deficiencies, calcium, blood chemistry, triiodothyronine, thyroxine, parathyroid hormone, feed supplements, dietary minerals, Gansu, Nei Mongol, Inner Mongolis, China.

Luzhang, R; Lixun, Z; Naifa, L; Zuhao, H; Muli, M; Kerong, X. **Distribution and population status of the wild Bactrian camel (*Camelus bactrianus ferus*) in Gansu Province, China.** *Journal of Camel Practice and Research.* 2005; 12(1): 59-63. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Between 1993 and 2002, the geographical distribution, habitat and number of wild Bactrian camels (*Camelus bactrianus ferus*) were investigated in Annanba Nature Reserve, Wanyaodun Nature Reserve and Yardan Geological Park. Over the past 1000 years, the distribution area of the wild Bactrian camel had shrunk to 1000 km2 west of Gansu Province. The major reasons were human activities, climatic change and grazing competition from domestic Bactrian camels and other domestic ungulates. The surveys revealed that the number of wild camel varied from 2 to 21, and mean sizes were 3.2-15.0 (camels/groups). Immature wild camels were 3.2% in Annanba Nature Reserve and 6.3% in Wanyaodun Nature Reserve. However, in February 2002, the percentage of adult male, female and immature wild camels were 23.9, 74.6 and 1.5%, respectively, among the 67 wild camels found in Annanba Nature Reserve. Severe winters and wild animal predation are major factors leading to low survival rates of immature wild camels. However, the most serious factor threatening wild camels in Annanba Nature Reserve is crossbreeding between wild camels and domestic camels. Reproduced with permission of CAB.
Descriptors: Bactrian camels, wild camels, populations, predation, survival, crossbreeding, endangered species, geographical distribution, Gansu, China.

Mosaferi, S; Niasari Naslaji, A; Abarghani, A; Gharahdaghi, AA; Gerami, A. **Biophysical and biochemical characteristics of Bactrian camel semen collected by artificial vagina.** *Theriogenology.* 2005 Jan 1; 63(1): 92-101. ISSN: 0093-691X
NAL call no: QP251.A1T5
URL: http://www.sciencedirect.com/science/journal/0093691X
Abstract: Seminal characteristics were investigated in Bactrian camel in this study. Semen samples from ten mature Bactrian camel bulls were collected using a modified bovine artificial vagina. The biophysical parameters including volume, color, sperm concentration and fast forward progressive motility, percentage of live sperm and the biochemical parameters including osmolarity, pH, glucose, calcium, phosphorus, chloride, triglycerides, phospholipids, total protein, albumin and non-protein nitrogen concentrations in seminal plasma

were measured. The mean time for semen collection was 5.3 +/- 0.29 min. The volume of semen varies from 1.2 to 26 (8.2 +/- 0.7 mls). The majority of semen samples (83.6%) were milky in color and consistency. The average osmolarity of semen was 316.1 +/- 1.48 mOsm/kg H2O. The pH of semen was slightly alkaline (7.4 +/- 0.03). The mean concentration of spermatozoa was 414.8 +/- 25.04 x 10(6) cells/ml. The fast forward progressive motility of spermatozoa was 62.4 +/- 1.57%. The percentage of live spermatozoa was 85.6 +/- 1.15. Seminal plasma concentration of glucose was 35.8 +/- 0.9 mg/dl. Non-protein nitrogen, total protein and albumin were 32.5 +/- 2.5, 2200 +/- 100 and 1100 +/- 100 mg/dl, respectively. The average concentrations of phospholipids and triglycerides in seminal plasma were 36.4 +/- 2.1 and 101.6 +/- 5.5 mg/dl, respectively. The concentrations of calcium, phosphorus and chloride were 8.2 +/- 0.1, 2.9 +/- 1.7 mg/dl and 97.9 +/- 2.9 mEq./l, respectively.
Descriptors: Bactrian camels, normal values, endangered species, sperm motility, Iran.

Narmuratova M; Konuspayeva G; Loiseau, G; Serikbaeva, A; Nathalie, B; Didier, M; Faye B. **Fatty acids composition of dromedary and Bactrian camel milk in Kazakhstan.** *Journal of Camel Practice and Research.* 2006; 13(1): 45-50. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The fatty acid composition of milk from dromedary (n=10), Bactrian (n=11) and hybrids (n=3) in Kazakhstan was analysed. The results confirmed the higher quantity of unsaturated fatty acids of camel milk compared to cow milk. Palmitic acid, stearic acid, oleic acid and myristic acid were the most important components of the camel milk fat. As the sampling method included 3 variation factors (species, season, regions) with not more than one sample per case, only general trends were observed. The milk samples collected during summer from bactrian camel in the Caspian region (Atyrau, Aralsk) tended to be richer in long chain fatty acids. On the other hand, the milk samples taken during winter from hybrid or dromedary camels in the southern part of Kazakhstan seemed richer in short chain fatty acids. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, camel milk, camel milk constituents, fatty acids; long chain fatty acids, short chain fatty acids, milk composition, myristic acid, oleic acid, palmitic acid, seasonality, short chain fatty-acids, stearic acid, unsaturated fatty acids, butterfat, Central Asia, hexadecanoic acid, octadecanoic-acid, tetradecanoic acid, Kazakhstan.

Odbileg, R; Konnai S; Ohashi, K; Onuma, M. **Molecular cloning and phylogenetic analysis of inflammatory cytokines of Camelidae (llama and camel).** *Journal of Veterinary Medical Science.* 2005; 67(9): 921-925. ISSN:
URL: http://www.soc.nii.ac.jp/jsvs
DOI: http://dx.doi.org/10.1292/jvms.67.921
Abstract: We cloned, sequenced and analysed the complementary DNAs encoding Camelidae inflammatory cytokines, including llama (*Lama glama*) interleukin (IL)-1 alpha , IL-1 beta , IL-6, tumour necrosis factor (TNF)- alpha and camel (*Camelus bactrianus*) IL-6 and TNF- alpha . The similarity levels of the deduced amino acid sequences of IL-1 alpha , IL-1 beta , IL-6 and TNF- alpha from llama (camel) to those from other mammalian species, ranged from 60.7-87.7%, 52.8-75.3%, 41.4-98.6 and 72.9-99.6%, respectively. Phylogenetic analyses based on nucleic acid sequences showed that llama IL-1 alpha , IL-1 beta , IL-6

and TNF- alpha were more closely related to those of camel, pig, cattle, sheep and horse than to those of human, dog, cat, mouse and rat. Reproduced with permission of CAB.
Descriptors: Bactrian camels, llamas, cytokines, amino acid sequences, complementary DNA, DNA cloning; immune system, immunity, interleukin 1, interleukin 6, nucleotide sequences, phylogenetics, tumor necrosis factor.

Reading , RP; Blumer, ES; Mix, H; Adiya, J. **Wild Bactrian camel conservation.** *Erforschung Biologischer Ressourcen der Mongolei*. 2005; 9: 91-100.
Descriptors: wild Bactrian camel; *Camelus bactrianus ferus*; endangered throughout range; little known of their natural history; conservation project; 1 male and 1 female collared; satellite telemetry for movement patterns; 1 year of data; home ranges; habitat use; sources of mortality; feces for forage assessment and steroid analysis; fecal collection of wolves to assess camels as prey; home range size; group size; populations; female travelled 4,527 km and her 100 % minimum convex polygon (MCP) home range was 17,232 km2; kernel home range sizes covered 8,696 km2 for 95%, 4,031 km2 for 75 %, 2,284 km2 for 55 %, and 612 km2 for 25 % kernels; male travelled a minimum of 683 km and his 100 % MCP home range extended over 9,191 km2; kernel home ranges covered 7,255 km2 for the 95 %, 3,741 km2 for the 75 %, 1,346 km2 for the 50%, 585 km2 for the 25%, and 115 km2 for the 5% kernel; China, Mongolia.

Salvelli, A; Calvi, LE; Sandri, C; Guadagnini, G; Kramer, L. **Efficacy of an in-feed formulation containing ivermectin for the control of gastrointestinal/pulmonary nematodes in non-domestic ungulates at the Parco Natura Viva, Bussolengo (VR).** In: K Frolich; F Steinbach (Editors). *Proceedings of the Institute for Zoo and Wildlife Research, Berlin.* 2005; (6): 275-276. ISSN: 1431-7338. Note: Erkrankungen der Zootiere. Verhandlungsbericht des 42. Internationalen Symposiums uber die Erkrankungen der Zoo- und Wildtiere, Prague, Czech Republic, 4-8 May, 2005.
URL: http://www.izw-berlin.de
Abstract: In this study, an in-feed formulation (UNIFEED) containing 10 mg/kg feed ivermectin was fed to giraffes (*Giraffa camelopardalis*), Grant's zebras (*Equus burchellii boehmi*), Grevy's zebras (*E. grevyi*), Cape elands (*Taurotragus oryx*), Bactrian camels (*Camelus bactrianus*), mouflon (*Ovis ammon*) and tahrs (*Ammotragus lervia*) at the Garda Zoological Park in Italy in September 2003. It was shown that strongylid (*Strongyloides* sp.) eggs were present in all species except in camels. Zebras were also positive for ascarids. Camels were only positive for *Trichuris* sp. Faecal egg counts were 50-1000 eggs per g faeces (epg), with the highest values in mouflon and tahrs. Mouflon were also infected with *Dictyocaulus* and *Protostrongylus* spp., while tahrs were only infected with the latter. Giraffes showed a 100% reduction in faecal egg counts, zebras showed 80% reduction in strongylid and 100% reduction in roundworm eggs and camels had no reduction in *Trichuris* counts 12 days after treatment. The epg values for mouflon and tahr herd samples raned from 0 (tahrs) to 50 epg (mouflon). Both species were negative for *Dictyocaulus* and *Protostrongylus* spp. After 23 days, all giraffes remained negative for nematodes, zebras showed 100% reduction in strongylid eggs compared to 12 days post-treatment, *Trichuris* sp. counts decreased from 50 to <50 epg, tahrs were negative and mouflon strongylid epg increased to 100 epg. These results show that mouflon may contaminate pastures for other species, and that ivermectin is insufficient to

control *Trichuris* sp. infection.
Descriptors: giraffes, Grants zebras, Grevy's zebras, Cape elands, Bactrian camels, mouflon, tahrs, zoo animals, fecal testing, helminth ova, animal parasitic nematodes, mixed infections, nematode infections, *Ammotragus lervia*, Ascaridiidae, *Dictyocaulus*, *Protostrongylus,* Strongylidae, Strongyloides, *Taurotragus oryx*, *Trichuris*, *Adenophorea*, *Ascaridida*, chemotherapy, drug therapy, feed additives, ivermectin-; potency multiple infections, *Rhabditida*, *Secernentea*, *Strongylida*, Garda zoological park, Italy.

Sopyev, B; Divanov, B; Charyev, C. **Diseases of camels, their preventive maintenance and treatment.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 60-66. ISBN 1586034731
Descriptors: dromedary camels, Bactrian camels, acaricides, brucellosis, clinical aspects, diagnosis, diminazene, disease prevalence, disease prevention, drug therapy, azidine, berenil, hydatid disease, hydatidosis, echinococcosis, epidemiology, helminthoses, licorice, mange, plague, smallpox, trypanosomiasis, vaccination, *Brucella*, *Cephalopina*, *Echinococcus*, *Glycyrrhiza*, *Sarcoptes scabiei*, *Taenia hydatigena*, *Trypanosoma*, *Yersinia pestis*, Turkmenistan, Central Asia.

Tasov, A; Alybaev, N. **Camel genetic resources and ways of camel breeding products use for population of Kazakstan arid areas.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 121-123. ISBN: 1586034731
Descriptors: arid zones, dromedary camels, Bactrian camels, camel breeding, selective breeding methods, camel genetic resources, camel meat, camel milk, milk production, wool, camel fiber products, arid regions, Kazakhstan, Central Asia.

Yusupov, H. **Camel - history of its domestication.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 33-34. ISBN: 1586034731
Descriptors: dromedary camels, Bactrian camels, history of domestication, archeology regarding camels, draft and working uses, Turkmenistan.

Vasilyev, AV; Shchelkanov, M Yu; Dzharkenov, AF; Aristova, VA; Galkina, IV; Lvov, DN; Morozova, TN; Kovtunov, AI; Grenkova, YeP; Zhernovoy, AV; Shatilov, VP; Slavsky, AA; Petrenko, MS; Chikrizov, PF; Dybal, VD; Leontyev, YeA; Gabbasov, FB; Odolevsky, YeA; Ibragimov, RM; Idrisova, RZ; Sokolova, NN; Artyukh, NP; Andreyeva, NI; Bondarev, AD; Deryabin, PG; Gromashevsky, VL. **Contamination of agricultural animals with West Nile virus in the Astrakhan region, as evidenced by the 2001-2004 serological surveys.** *Voprosy Virusologii*. 2005; 50(6): 36-41. ISSN: 0507-4088. Note: In Russian with an English summary.
Abstract: Sera sampled from 2884 farming animals in the Astrakhan Region, Russia, during 2001-04 were investigated using haemagglutination inhibition test (HIT) in order to indicate specific antibodies to West Nile virus (WNV). HIT-positive samples were investigated by the neutralization test (NT). WNV antibodies were detected in all the examined species of animals: horses (the proportion of positive tests throughout the observation averaged

9.8%; the agreement with NT results was 94.1%), cattle (6.4% and 72%), camels (5.2% and 41.7%), pigs (3.1% and 75%), and sheep (2.2% and 57.1%). Relationships between the environmental features of WNV in different natural zones, the infection rate, and the conditions of keeping farming animals in the Astrakhan region are analysed. Reproduced with permission of CAB.
Descriptors: cattle, pigs, swine, horses, sheep, Bactrian camels, humans, West Nile virus, epidemiology, human diseases, seroprevalence, West Nile fever, zoonoses, zoonotic infections, Astrakhan.

Wernery, U **The most important infectious diseases in camelids.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 67-69. ISBN 1586034731
Descriptors: camelids, dromedary camels, Bactrian camels, anthrax, aspergillosis, brucellosis, coccidioidomycosis, coccidiosis, endotoxemia, enterotoxemia, melioidosis, mycoses, nematode, infections, paratuberculosis, Johne's disease, pasteurellosis, rabies, salmonellosis, scabies, smallpox, trematode infections, trypanosomiasis, tuberculosis, zoonoses, influenza, *Aspergillus,Bacillus anthracis*, borna disease virus, *Brucella*, *Burkholderia pseudomallei*, *Clostridium perfringens*, *Coccidioides immitis*, Digenea, *Eimeria*, equid herpesviruses, *Mycobacterium avium* subsp *paratuberculosis*, *Mycobacterium tuberculosis*, *Nematoda*, *Pasteurella*, rabies virus, *Rhodococcus* bacteria, *Rickettsia*, Rotavirus, *Salmonella* infections, *Sarcoptes scabiei*, *Trypanosoma evansi*.

Wu Run; Chen HaoTai; Liu XiangTao; Xie QingGe. **Cloning and sequence analysis of prion protein gene from *Camelus bactrianus.*** *Chinese Journal of Veterinary Science and Technology.* 2005; 35(12): 969-973. ISSN: 1000-6419. Note: In Chinese with an English summary.
Abstract: Genomic DNA was extracted from peripheral whole blood of four *Camelus bactrianus.* The PrP gene was amplified by PCR using a pair of primers, and then cloned into pMD 18-T vector. Sequencing revealed that the four Camelus bactrianus genes were 768, 768, 792 and 795 bp in length. All the entire PrP coding sequences had the complete ORFs contained within a single exon and were very similar to the published gene sequences of *Camelus dromedarius*. The sequences of PrP gene contained 5 or 6 copies of a short, G-C-rich element which encoded the octapeptide Pro-His-Gly-Gly-Gly-Trp-Gly-Gln or the nonapeptide Pro-Gln/His-Gly-Gly-Gly-Gly-Trp-Gly-Gln. All the amino acid sequences of these genes had an N-terminal signal peptide of 24 amino acids, and a C-terminal signal peptide of 22 amino acids (with the exception of the LT200302 clone which contained a C-terminal signal peptide of 23 amino acids). Comparison of these genes revealed that the sequence identities of nucleotide and their putative amino acid ranged from 91.0 to 100.0% and from 94.2 to 100.0%, respectively. Out of the 133 base substitutions, 107 substitutions were synonymous mutation, and 26 produced amino acid mutation. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, prion diseases, prion proteins, ORFs, amino acid sequences, amino acids, DNA cloning, exons, genes, mutations, nucleotide sequences, open reading frames, signal peptide.

Zhang, H; Yao, J; Zhao, D; Liu, H; Li, J; Guo, M. **Changes in chemical composition of Alxa Bactrian camel milk during lactation.** *Journal of Dairy Science.* 2005; 88(10): 3402-3410. ISSN: 0022-0302

URL: http://jds.fass.org/cgi/content/abstract/88/10/3402

Abstract: Changes in chemical composition of Alxa Bactrian camels reared in Inner Mongolia (China) during lactation were investigated. Colostrum and milk samples from 10 nomadic female camels in their first season of lactation were collected periodically from parturition until 90 d postpartum (PP). The average contents of gross composition were 14.23% protein, 4.44% lactose, 0.27% fat, 0.77% ash, and 20.16% total solids in colostrum at 2 h PP, and the respective mean values were 3.55, 4.24, 5.65, 0.87, and 14.31% for regular milk on d 90. A 15-fold increase was shown in fat content during the first 24 h, whereas a sharp decrease was shown during the first 12 h of lactation in protein, ash, and total solids contents. Variation in lactose content was small (4.24 to 4.71%) throughout the study period. Total N, nonprotein N, casein N, and whey protein N were found to be 2.23, 0.06, 0.86, and 1.31 g/100 mL for the colostrum at 2 h PP; and 0.56, 0.04, 0.45, and 0.07 g/100 mL for the milk at 90 d PP. Percentages of caseins increased steadily, whereas whey proteins declined gradually until 3 mo of lactation. Gas liquid chromatography analysis of milk fat showed that the content of even-numbered saturated fatty acids (C< sub>12:0</ sub>-C< sub>18:0</ sub>) in camel colostrum (2 h to 7 d PP) was lower than that of regular milk (15 to 90 d PP). The predominant saturated fatty acids were C< sub>14:0</ sub>, C< sub>16:0</ sub>, and C< sub>18:0</ sub>, regardless of the stage of lactation. There was a considerable level of polyunsaturated fatty acids (mainly C< sub>18:1</ sub>) in Alxa camel's milk fat. The levels of Ca, P, Na, K, and Cl were 222.58, 153.74, 65.0, 136.5, and 141.1 mg/100 g, respectively, at 2 h PP; the values of the minerals were 154.57, 116.82, 72.0, 191.0, and 152.0 mg/100 g, respectively, for the regular milk on d 90. The levels of vitamins A, C, E, B< sub>1</ sub>, B< sub>2</ sub>, B< sub>6</ sub>, and D were 0.97, 29.60, 1.45, 0.12, 1.24, 0.54 mg/L, and 640 IU/L, respectively, in Alxa camel milk at 90 d PP. Vitamin A and C contents were higher and vitamins E and B< sub>1</ sub> were lower than those in colostrum. Sodium dodecyl sulfate-PAGE and densitometry results demonstrated that Alxa camel colostrum is rich in immunoglobulins, serum albumin, and 2 unknown fractions, which are reduced in amount (%) within 2 d of lactation. It seems that there is lack of beta -lactoglobulin in Alxa camel milk, whereas casein and alpha -lactalbumin start at a low level and increase gradually until they reach their regular levels in the milk. Reproduced with permission of CAB.

Descriptors: Alxa Bactrian camels, changes due to lactation, colostrum, camel milk composition, lactose, alpha lactalbumin, beta lactoglobulin, ascorbic acid, ash, calcium, casein, chlorine, fatty acids, gas liquid chromatography, immunoglobulins, lactose, milk fat, saturated fatty acids, polyunsaturated fatty acids milk proteins, minerals, nitrogen, nonprotein nitrogen, phosphorus, polyenoic fatty acids, potassium, retinol, riboflavin, SDS PAGE, serum albumin, sodium, thiamine, total solids, vitamin D, vitamin E, vitamins, whey protein, aneurin, axerophthol, butterfat, sodium dodecyl sulfate vitamin A, vitamin A alcohol, vitamin A1, vitamin B1,vitamin B2, vitamin C.

Zhao, WH; Zhang, XB; Du, XH; Saberi, BB; Wang, JL. **Architecture of pulmonary, interstitial microvessels in Bactrian camel (*Camelus bactrianus*).** *Journal of Camel Practice and Research.* 2005; 12(1): 13-16. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to observe the microvessels of the lungs and determine the adaptability of Bactrian camels (*Camelus bactrianus*) to draught and arid environment (n=6, 4 castrated males and 2 females). The microvasculature of the lungs of the bactrian camels was studied using the scanning electron microscopy. The results revealed that the microvessels of the lungs were branched, coursed regularly and densely arranged. The corrosion casts was a complex three dimensional network. Numerous anastomoses were found between the pulmonary interstitial and pulmonary microvessels. Although only part of the connection between subpleural and interstitial vessels were observed, it was found that there were multi-regulating mechanism between the body and pulmonary circulations in the Bactrian camel resulting to the strong endurance of the camel to the rigorous environment.
Descriptors: Bactrian camels, blood vessels, lungs, histology, morphology.

2004

Al Ani, Falah Khalil Abdul-Razzak. ***Camel Management and Diseases***. Amman: Dar Ammar Book Pub., c2004. xvi + 455pp. ISBN 9957445006; 9789957445003. Note: With 16 consultant contributors." Includes bibliographical references and index.
NAL call no: SF997.5.C3.A43 2004
Abstract: This is a reference book on camels and includes 30 chapters that deal with the different aspects of camel management and diseases. Most chapters are on the dromedary but there is a chapter on bactrian camel and one on South American camelids. The book also covers the socio-economics of the camel in nomadic life and the history of the camel in pre-Islamic and in Islamic society, and camel sports. Most of the chapters are devoted to the physiology and diseases of the various body systems, diseases by pathogen type (viral, bacterial, parasitic, and fungal), clinical examination, anaesthesia and surgery, nutrition and digestion, management and husbandry. The text is supported by numerous black and white photographs. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, camel diseases, camel husbandry, camel breeding, camel nutrition, camel physiology, infectious diseases, reproduction, diagnostic techniques, therapy, etc.

Cardellino, R; Rosati, A; Mosconi, C (Editors). **Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004.** *ICAR Technical Series.* 2004; (11): 163 p. ISSN: 1563-2504. ISBN: 9295014065.
Abstract: This proceedings contains 14 conference papers on the breeding, handling systems and milk, meat and fibre production of Bactrian and dromedary camels, llamas, guanacos, alpacas and vicunas in Asia, Africa, Arab Gulf countries and South America. Reproduced with permission of CAB.
Descriptors: camelids, dromedary camels, Bactrian camels, llamas, vicunas, guanacos,

alpacas, camelid breeding; animal fibers, meat production, milk production, wool production, Africa, Arab Countries, Asia, South America.

Cui, S; Wang, JH; Xie, ZM. **The nervous supply to the nasal cavity of the Bactrian camel (*Camelus bactrianus*).** *Veterinary Research Communications*. 2004 Jan; 28(1): 1-5. ISSN: 0165-7380

Abstract: The Bactrian camel is an important domestic animal in some of the desert and semi-desert areas of the world. However, there is no detailed report about the nervous supply to the nasal cavity of the Bactrian camel. In the present study, seven heads of adult Bactrian camels were collected and the nerve distribution in the nasal cavity was dissected grossly. The results demonstrated that the nerves supplying to the nasal cavity included the olfactory nerve, the ethmoidal nerve from the ophthalmic nerve, and the caudal nerve from the maxillary nerve. The general patterns of nervous distribution in the nasal cavity of the Bactrian camel corresponded with those of other domestic animals. However, the terminal nerve was not observed by this gross anatomical method in the Bactrian camel.

URL: http://www.kluweronline.com/issn/0165-7380/contents

Descriptors: Bactrian camels, peripheral nerves, nasal cavity, olfactory organs, tissue distribution, gross anatomy, histology, nerve tissue, olfactory bulb, ethmoidal nerve, caudal nasal nerve, olfactory nerve, vomeronasal nerve.

Cui, S; Wang, J; Xie, ZM. **The nerve supply to the orbit of the Bactrian camel.** *Veterinary Research Communications.* 2004 Jan; 28(1): 7-15. ISSN: 0165-7380

URL: http://www.kluweronline.com/issn/0165-7380/contents

NAL call no: SF601.V38

Abstract: The Bactrian camel is an important domestic animal in some desert and semi-desert areas of the world, but there is no detailed description of the nervous supply to the orbit in this animal. In this study, 10 heads of adult Bactrian camels were collected and the nerves supplying the orbit were examined grossly. The results showed that the nerves supplying the orbit included the optic nerve, oculomotor nerve, trochlear nerve, abducent nerve, the branches of ophthalmic nerve and the maxillary nerve. The anatomical characteristics of the origins, courses and distributions of the nerves to the orbit in the Bactrian camel were described and compared with those of other domestic animals. These results have importance for further research on the comparative neuroanatomy, neurophysiology and the related clinical surgery of the camel.

Descriptors: Bactrian camels, peripheral nerves, face, eye enervation, muscles, skeletal muscle, histology, tissue distribution, optic nerve, oculomotor nerve, trochlear nerve, ophthalmic nerve, ethmoidal nerve, maxillary nerve, neuroanatomy, specoes comparison, nerve origin.

Gahlot, TK; Kataria, N. ***Selected Research on Camelid Physiology and Nutrition***. Published by the The Camelid Publishers, Bikaner, India. 2004; viii + 837 pp. ISBN: 8190114123

Abstract: This 837-page publication is a compilation of previously published papers, primarily written for students, teachers, field veterinarians and scientists seeking information on various aspects of camelid physiology and nutrition. The different topics include: adaptation, stress and dehydration; urine, cerebrospinal fluid, synovial fluid, sweat and blood, as well

as camel milk biochemistry; endocrinology; enzymology; haematology; and nutritional and digestive, as well as renal physiology. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, adaptation, camel nutrition, camel physiology, reproductive physiology, stressors, effects of dehydration and sweat glands, camel milk, blood-chemistry, cerebrospinal fluid, digestion, endocrinology, enzyme activity, enzymes, hematology, hormone secretion, organ physiology, publications, renal function, stress, stress response, synovial fluid, urine, endocrine secretion, hematology, kidney function.

Garcia-Pereira , FL ; Allen, A; Anouassi, A; Tibary, A. **Parainguinal cryptorchidectomy under general anaesthesia in a Bactrian camel (*Camelus bactrianus*).** *Journal of Camel Practice and Research.* 2004; 11(2): 103-107. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The present paper describes general anaesthesia technique and surgical parainguinal approach to remove an abdominal testis in a 2-year-old Bactrian camel in Washington, USA [date not given]. The testis was located by transabdominal ultrasonography in an area adjacent to the inguinal ring. General anaesthesia was induced by guaifenesin 5% (200 ml intravenously (IV)) followed by a bolus of ketamine (1050 mg IV) and maintained with isoflurane in oxygen. The parainguinal approach to cryptorchidectomy as described was performed without complications, with a smooth and uneventful recovery. Reproduced with permission of CAB.
Descriptors: Bactrian camel, young male, undecended testes, cryptorchidism, diagnosis, surgical removal technique, case report, clinical aspects, anesthesia, anesthetics, guaifenesin, isoflurane, ketamine, Washington State, US.

Hare, John. **The wild Bactrian camel; a critically endangered species.** *Endangered Species Update.* 2004 January-March; 21(1): 32-35. ISSN: 1081-3705. Note: In English with Spanish and English summaries.
Descriptors: 900 wild Bactrian camels, remnant herds, critical endangered species, threatened by wolf predation, illegal mining, cross breeding with domestic camels, conservation organization, The Wild Camel Protection Foundation, UK registered charitable foundation, established in 1997, aiding in establishing nature reserves, working with captive breeding programs for species survival, China, Mongolia.

Hertrampf, JW. **Das "Wustenschiff" als Fleischlieferant: Eine Betrachtung zum Verzehr von Kamelfleisch.[The "ship of the desert" as a meat supplier.]** *Fleischwirtschaft.* 2004; 84(12): 111-114. ISSN: 0015-363X. Note: In German with an English summary.
Abstract: The camel is a multipurpose animal. It yields labour, milk, meat, wool and leather. The camel has been domesticated around 3,000 to 2,500 years a.c. ago in the south of the Arabic peninsula. Since its domestication, the camel has always provided men with protein and energy. In the Islamic world, the camel is slaughtered for ritual purposes. However, not all tribes of the Middle East, Africa and the Sub-continent consume camel meat. The camel meat is slightly different to that of cattle. Selective breeding of camels for certain properties, e.g. meat, is still in the infant stage. So far, camels are slaughtered predominantly at the time their labour performance and milk yield declines or the camel cow is infertile. Camel's meat yield is depending on the age of the animals and the environmental condition it is living in.

In addition the camel breed is important for the meat yield. Birth weight of dromedary calves are highest in India and lowest in Tunisia. Consequently the recorded daily weight gain varies widely. This applies also for the carcass yield of adult animals. The carcass of dromedaries is lighter (mean weight 274.0 kg) than those of the Bactrian camel (312.3 kg). Male dromedaries are heavier (283.2 kg) than females (249.5 kg). The chemical composition of camel meat is not much different to the chemical composition of cattle meat. Camel meat is generally lean. It is missing both inter as well as intra muscular fat. However, with increasing age of the animals, the meat is tough. Reproduced with permission of CAB.
Descriptors: Bactrian camel, dromedary camel, body fat, camel meat, carcass quality, meat chemical composition, weight gain.

Jianlin, H; Ochieng, JW; LKhagva, B; Hanotte, O. **Genetic diversity and relationship of domestic Bactrian camels (*Camelus bactrianus*) in China and Mongolia.** *Journal of Camel Practice and Research.* 2004; 11(2): 97-99. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The number of domestic Bactrian camels has been decreasing rapidly in recent years in Central Asia, whereas very little is known about their genetic diversity and relationship. Most of these animals are found today in China and Mongolia. Here, we used 12 microsatellite DNA markers to characterize 140 domestic Bactrian camels from 4 populations in China (n=84) and 2 populations in Mongolia (n=56). It was shown that genetic diversity, expressed as the mean number of alleles and expected heterozygosity (He), was similar in all populations. Genetic distances (D< sub>S</ sub> and D< sub>A</ sub>) indicate closer genetic relationships between populations within each country than between the Chinese and Mongolian populations. Significant differentiation indices (Fst) were obtained for all between-country comparisons (P<0.01). However, within countries the Fst value between the 2 Mongolian populations and between 4 of the 6 pairwise comparisons between Chinese populations were not significant (P>0.05). The lack of genetic differentiation among the Chinese populations is possibly a historical legacy of trading along the Silk Road which favoured gene flow between populations. For Mongolia, it is possibly the result of interbreeding between populations following transhumance. Our results indicate that the domestic Bactrian camels from China and Mongolia should be considered as distinct populations in conservation and breeding programmes. Reproduced with permission of CAB.
Descriptors: Bactrian camels,alleles, animal genetic resources, DNA, gene flow, genetic distance, genetic diversity, genetic markers, heterozygosity, microsatellites, population genetics, China, Mongolia.

Jasra, AW; Mirza, MA. **Camel production systems in Asia.** *ICAR Technical Series.* 2004; (11): 37-49. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
URL: http://www.icar.org/DOCS/technical_series_11_sousse.pdf
Abstract: Due to the uneven distribution of the global population (i.e. 18.58 million heads), >80% of camels are found in Africa. Asia is the second largest home of camelids, where 70% of the population is found in India and Pakistan. Both dromedary and Bactrian camels are found in Asia; however, the former is in majority. All camel habitats are unique ecologi-

cal niches, i.e. extremely marginalized and highly inaccessible temperate as well as tropical deserts. The physical/physiological uniqueness of camels enabled humans to inhabit these deserts, hence pastoralism involving exclusively camels or mixed livestock remains the dominant use of natural resources in arid and semiarid ecosystems of Asia. Within these ecological specificities, camel production is the mainstay of livelihood. Being an extremely low input animal, the camel has been supporting the main subsistence needs of pastoralists across large-scale biological and geopolitical diversities, The camel has been the key resilient animal species of pastoralists to absorb various external shocks particularly climatic and geopolitical vulnerabilities. The adventitious vulnerabilities of camel pastoralists had led to various camel production systems. The Camel Applied Research and Development Network (CARDN) in Pakistan has documented the camel production systems in the Indo-Pakistan subcontinent based on sociocultural terms. Hence, three categories of camel pastoralists have been recognized which are migratory or nomadic pastoralists, transhumant or semi-migratory pastoralists and sedentary or household pastoralists. The International Livestock Research Institute (ILRI) has reported 10 global livestock production systems. The agro-ecologically based production systems are also directly applicable to camel production systems in Asia. The livestock production systems have been redefined in a commercial context. These include (a) traditional rural livestock production, (b) commercial milk production and (c) desert/rangeland production. These are equally good to be used for camel production. The camel production systems have very recently been reported as (a) traditional systems, (b) periurban systems and (c) ranching of camels. Although a very complex issue, we need to define camel production systems based on universally agreed parameters. As a consequence of vulnerability to external forces, the socioeconomic transformation of the camel as well as other pastoralists is emerging as a gradual phenomenon, hence the treasures of biological and cultural diversity are at stake. This changing scenario calls for appropriate collaborative research and development initiatives to optimize the general understanding of key external shocks like the macroeconomic framework, demography and access to land and other natural resources, drought and other climate-related events. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, herd size, livestock production, camel farming systems, livestock numbers; milk production, nomadism, pastoralism, socioeconomics, transhumance, Asia, India, Pakistan.

Li XiaoMing; Chen HuaiTao. **Histological structure and adenocyte ultrastructure of glandular saccus regions in the proventriculus of Bactrian camel.** *Chinese Journal of Veterinary Science and Technology*. 2004; 34(4): 21-24. ISSN: 1000-6419. Note: In Chinese with an English summary.
Abstract: The glandular saccus regions of the proventriculus of 8 Bactrian camels from Nei Monggol Autonomous Region were studied for histology, histochemistry and electron microscopy. It was observed that the glandular saccus regions are composed of the tunica mucosa, submucosa, tunica muscularis and serosa. The glandular saccus region is divided into the glandular pars and non-glandular pars. The surface of the glandular pars is covered with simple cuboidal epithelium. The lamina propria is thick and has many mucous glands. The glandular cells include many mucous cells and a few parietal cells and endocrine cells. The cell ultrastructure is similar to the cells of the cardiac glands of bovines. The histological structure of the non-glandular pars is similar to that of the regions of the non-glandular sacs.

The surface is covered with stratified columnar epithelium. The cutins is obvious. It has thin lamina propria and has no glands. The muscularis mucosa is thin and not continuous.
Descriptors: Bactrian camels, camel anatomy, proventriculus, histology, histochemistry, tissue ultrastructure, electron microscopy, morphology, lamina propria.

Li, Xi; Zhao, Xin Xu. **Separation and purification of ovulation-inducing factors in the seminal plasma of the Bactrian camel (*Camelus bactrianus*).** *Veterinary Research Communications.* 2004 Apr; 28(3): 235-245. ISSN: 0165-7380
URL: http://www.kluweronline.com/issn/0165-7380/contents
NAL call no: SF601.V38
Descriptors: ovulation, Bactrian camels, females, follicle stimulating hormone, FSH, luteinizing hormone, LH, hormonal regulation, ovarian follicles, follicular development, seminal plasma factors, separation purification, bioactive properties, rats, pituitary gland, cell culture, intramuscular injection, hormone secretion, chemical concentration, methods.

Rahbarizadeh, F; Rasaee, MJ; Moghadam, MF; Allameh, AA; Narang, SA; Sadeghizadeh, M. **Induction of immune response in *Camelus bactrianus* and *Camelus dromedarius* against MUC1 - peptide produced heavy-chain antibodies with efficient combining properties.** *Journal of Camel Practice and Research.* 2004; 11(1): 1-9. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Camelidae are known to possess antibodies devoid of light chains and C< sub>H</ sub>1 domains. Antigen-specific fragments of these heavy-chain IgGs (VHH) are of great interest in biotechnology applications. The first example of successfully raised heavy-chain antibodies in Camelus dromedarius and Camelus bactrianus against the MUC1 peptide were reported in this paper. Camels (n=2) were immunized against cancerous tissue and peptide conjugated to bovine serum albumin. Both conventional and heavy-chain IgG antibodies were produced in response to MUC1-peptide. Enzyme linked immunosorbent assays (ELISAs) and Western blotting for MUC1 peptide conjugated to BSA, deglycosylated human milk fat globule membrane (HMFG) and cancerous breast tissues were established to investigate the titre development. Three subclasses of IgG in both camels were separated chromatographically. All three subclasses of IgG in both camels were bound to the MUC1 peptide. This study demonstrated specific in vitro targeting of MUC1 peptide by camel heavy-chain antibodies. It might open new prospective for their future and practical application as tumour-targeting tools, due to their small size and soluble behaviour. Reproduced with permission of CAB.
Descriptors: Bactrian camels, dromedary camels, antibodies, IgG, immune response, immunity, immunization, mucins, cancers, ELISA, Western blot MUC1, neoplasms, peptides.

Saipolda, T. **Mongolian camels.** *ICAR Technical Series.* 2004; (11): 73-79. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
URL: http://www.icar.org/DOCS/technical_series_11_sousse.pdf
Abstract: AB: In the world there are about 19.1 million head of camels, including 0.8 million of Bacterian; about 30% of this last one bred are in Mongolia. In 1954, there

were 895.3 thousand head of Bacterian in the country but last years the number of camels decreased by 3 times, as result of increased production for camel meat and losses of them after livestock privatization. Nowadays, Mongolian two humped camels are endangered species. Reproduced with permission of CAB.
Descriptors: Bactrian camels, camel production, conservation, endangered species, reproduction, Mongolia.

Sekine, J; Nawata, T; Kamel, HEM; Oura, R. **Particle size distribution of digesta in the diverse sites of the alimentary tract of a camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 453-456. ISBN: 8190114123
Descriptors: Bactrian camel, dromedary camels, cecum, colon, rectum, small intestine, crossbreds, crude protein, digesta, digestion, digestive tract, distribution, dry matter, fiber, fibre, fore stomach, stomach, lignin, particle size; rectum, small intestine.

Straub. **Stiftung zum Schutz von Yak-Kamelen. [Foundation for the Protection and Yaks and Camels.]** *Tierarztliche Umschau.* 2004; 59(7): 416-417. ISSN: 0049-3864. Note: In German.
URL: http://www.tu-online.de/
Descriptors: Bactrian camels, yaks, conservation, organization formed to protect yaks and camels.

Wernery, U; Kaaden, OR. **Foot-and-mouth disease in camelids: a review.** *Veterinary Journal.* 2004; 168(2): 134-142. ISSN: 1090-0233
DOI: http://dx.doi.org/10.1016/j.tvjl.2003.10.005
Abstract: Foot-and-mouth disease (FMD) in South American camelids, in dromedaries and Bactrians is reviewed. Recent well-executed experimental studies in New World camels indicate that, although the llama and alpaca can be infected with FMD virus (FMDV) by direct contact, they are not very susceptible and do not pose a risk in transmitting FMD to susceptible animal species. They do not become FMDV carriers. Reports on FMD in dromedaries are, however, conflicting. Serological investigations in Africa and the United Arab Emirates (UAE) on thousands of camel sera were negative and experimental infections have been conducted on only a few dromedaries with one serotype and in one country. The design and execution of most of these experiments were poor and therefore the conclusions are questionable. From these investigations, it seems that dromedaries can contract the disease after experimental infection and through close contact with FMD diseased livestock, but do not present a risk in transmitting FMD to susceptible animals. They do not become FMDV carriers. Recent reports from Mongolia describe similar FMD lesions in Bactrian camels. However, so far no samples have tested positive for FMD. To clarify the situation in Bactrians, samples from suspected clinical cases should be tested because other viral vesicular diseases cannot be distinguished from FMD. Thus, further research on the epidemiology of FMD in camelids is necessary. This would include large-scale serological investigations and experimental infections with different FMD serotypes in connection with susceptible contact animals. The Office International des Epizooties (OIE) Code chapter on FMD includes camelids as being susceptible species to FMD, giving the impression that they are similar

to cattle, sheep, goats and pigs in their potential involvement in the epidemiology of FMD. This is clearly not the case, and this issue should be re-addressed by the relevant authorities. *Reproduced with permission of CAB.*

Descriptors: Bactrian camels, dromedary camels, experimental infection, foot and mouth disease, FMD virus, disease prevalence, disease transmission, susceptibility to FMD, epidemiology, disease geographical-distribution, lesions, reviews, Africa, Mongolia, United Arab Emirates.

Yu ShiYuan; Du XiaoHua; Li HaiYan; Wang JianLin; Wang ZiRen. **Architecture of subpleural microvessel of the lung in bactrian camel (*Camelus bactrianus*).** *Journal of Camel Practice and Research.* 2004; 11(1): 27-34. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The subpleural microvessel of the lungs in the Bactrian camel (*Camelus bactrianus)* was studied using replica scanning electron microscopy. The whole lungs of 6 Bactrian camels (4 males and 2 females) were collected from an abattoir. The microvessels of the lungs were arranged densely, branched and coursed regularly, of which the corrosion casts revealed a complex 3-dimensional network completely. According to the microvascular architecture, the subpleural microvessel mainly comprised the arteriole, terminal arteriole, precapillary arteriole, and capillary. In some cases, the terminal arteriole directly gave rise to a large number of capillaries, which anastomosed with each other, forming the subpleural capillary network. The network was loose, and the diameter of the mesh was larger than that of the capillary. Moreover, the mesh was often hexagon and pentagon in appearance. There were obvious impressions of the smooth muscles on the surface of the casts of the arteriole, the terminal arteriole and the precapillary arteriole. On the surface of the casts of the precapillary arteriole and the capillary, obvious impressions of the endothelial nuclei were observed. Reproduced with permission of CAB.

Descriptors: Bactrian camel, lungs, camel lung anatomy, blood vessels, capillaries, endothelium, morphology, smooth muscle, body components, endothelial cells.

Arabian: Anatomy

2008

Kassab, A. **The normal anatomical, radiographical and ultrasonographic appearance of the carpal region of one-humped camel (*Camelus dromedarius*).** *Anatomia Histologia Embryologia Journal of the World Association of Veterinary Anatomists.* 2008 Feb; 37(1): 24-29. ISSN: 0340-2096
DOI: http://dx.doi.org/10.1111/j.1439-0264.2007.00790.x
NAL call no: SF761 .Z4
Abstract: The macroscopic, radiographic and ultrasonographic anatomy of the carpal region of eight clinically normal camels (*Camelus dromedarius*) was determined with the help of a 7.5-MHz linear transducer. At the dorsal aspect of the carpus and distal radius, the extensor carpi radialis, extensor digitorum communis and extensor digitorum lateralis tendons were easily identified. The ulnaris lateralis tendon was observed laterally. The extensor carpi obliqus tendon was identified with difficulty. At the palmar aspect, the flexor carpi radialis, the flexor digitorum superficialis and the flexor digitorum profundus tendons were observed. Other soft structures examined include the lateral collateral ligament and the medial collateral ligament. Ultrasonographic findings correlated with gross anatomy in the dissected limbs. The results of the present study serve as reference data for ultrasonographic investigation of disorders of camel carpus.
Descriptors: dromedary camels, normal camels, anatomical structure, carpal region, macroscopic anatomy, radiography, ultrasonography, tendons, muscles, ligaments, reference data.

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Abou el Ella, AG. **Ultrasonographic images of the clinically normal mammary gland in one-humped camels (*Camelus dromedarius*).** *Veterinary Medical Journal Giza*. 2007; 55(1): 87-99. ISSN: 1110-1423. In English with an Arabic summary.
Abstract: The ultrasonographic images of clinically normal mammary glands of 14 one-humped she-camels were recorded using 5.0 and 7.5 MHz linear transducer. The obtained results were confirmed through dissection of three mammary gland samples obtained freshly from the slaughterhouse. The glandular parenchyma of the udder of non-lactating she-camels appeared uniformly hyperechoic than that of the lactating one. At the base of each quarter two distinct gland cisterns were seen shared, a common hyperechoic wall, while the cistern cavity appeared anechoic because of presence of milk. The teat wall was differentiated into four ultrasonographic layers. Each teat possessed two separate anechoic teat cistern separated with a hyperechoic connective tissue band and communicated with the outside of the teat with a separate streak canal, which appeared as a thin, hyperechoic line. We can

conclude that ultrasonographic imaging of the mammary gland in one-humped camels is a noninvasive imaging technique which can be performed in both standing and recumbent positions. The teats of one-humped she camels possess only two cisterns and two separate streak canals like other Camelidae species. Moreover, the normal ultrasonographic pattern of the mammary gland will be helpful for further studies dealing with diagnosis of different mammary gland diseased conditions. Reproduced with permission of CAB.
Descriptors: dromedary camels, diagnosis, diagnostic techniques, mammary glands diseases, morphology, teats, ultrasonography.

Abshenas, J; Vosough, D; Masoudifard, M; Molai, MM. **B-mode ultrasonography of the udder and teat in camel (*Camelus dromedarius*)**. *Journal of the Faculty of Veterinary Medicine, University of Tehran.* 2007; 62(2): 27-31. ISSN: 1022-646X. Note: In English with a Persian summary.
Abstract: The aim of the present study was to determine the normal ultrasonographic features of the mammary gland and teats of lactating camels. Udders of ten camels were obtained from a local slaughterhouse. B-mode ultrasonographic examination of the udders in water bath by 6.5-8.5 MHz linear array transducer was performed. Normal sonographic findings were described and teat canal length, teat end width, teat wall thickness, teat cistern width and middle cistern wall thickness were also measured. Results were analysed by Paired sample t-test. In lactating camels, the streak canal, teat sinus, gland sinus and lactiferous ducts were imaged easily. The teat wall can be divided into 3 layers, including a hyperechoic outer layer, a hypoechoic thicker middle layer and a less hyperechoic inner layer. The intercisternal wall of each teat can be divided into 3 layers: two thin hyperechoic outer layers and a thicker hypoechoic middle layer. The B-mode ultrasonography technique is reliable for determining the anatomic features of the udder and measuring teat parameters of camels.
Descriptors: dromedary camels, anatomy, diagnostic techniques, lactation, mammary glands, udders, teats, ultrasonography, normal values.

Ali, AM; Al Thnaian, TA. **Preservation of ruminant and equine anatomical specimens by silicone plastination.** *Scientific Journal of King Faisal University Basic and Applied Sciences.* 2007; 8(1): 111-119. ISSN: 1658-0311. Note: In English with an Arabic summary.
Abstract: Plastination is a method of preserving biological specimens by replacing the tissue water and lipid with a curable plastic polymer. In this study this technique was used to preserve gross specimens from sheep, ox, horse and camel. The specimens were fixed in 10% buffered formalin, dehydrated in cold -25 degrees C acetone and impregnated with silicone at -25 degrees C under vacuum. The final step involved drainage of excess fluids and exposure of specimens to the curing agent (BiodourTM S6). The plastinated specimens obtained by this method were dry, durable, non-toxic, odourless and could be stored at room temperature. Reproduced with permission from CAB.
Descriptors: cattle, dromedaries, horses, sheep, body components preservation, animal anatomy, morphology, tissue preservation techniques, plastination techniques.

Altunay, H. **Fine structure of the retinal pigment epithelium, Bruch's membrane and choriocapillaris in the camel.** *Zentralblatt fur Veterinarmedizin—Journal der Weltvereinigung der-Veterinaranatomen Reihe C Anatomia-Histologia Embryologia* **:** . 2007 Apr; 36(2): 116-120. ISSN: 0340-2096
URL: http://www.blackwell-synergy.com/issuelist.asp?journal=ahe
DOI: http://dx.doi.org/10.1111/j.1439-0264.2006.00736.x
NAL call no: SF761.Z4
Abstract: The morphology of the retinal pigment epithelium (RPE) and closely associated Bruch's membrane and choriocapillaris was investigated by light and transmission electron microscopy in the camel (*Camelus dromedarius*). The study showed that RPE is composed of a single layer of hexanocuboidal cells that were joined laterally by a series of apically located tight junctions. In addition, adjacent from internal side of cell membrane at the level of tight junctions, an undefined structure which resembled the myofibrillar organization of skeletal muscles in appearance was located. These cells displayed numerous short basal infoldings and abundant thin apical processes which enclosed the rod outer segments. The epithelial cell nuclei were large, vesicular and eccentrically located. Within the epithelial cells, smooth endoplasmic reticulum was very abundant, while rough endoplasmic reticulum was present only in small amounts. Polysomes were also numerous and the mitochondria often displayed a ring-shaped structure. Lipofuscin granules were plentiful in all locations. Bruch's membrane (complexus basalis) was typically pentalaminate throughout the retina. The endothelium of the choriocapillaris facing Bruch's membrane was extremely thin and heavily fenestrated. These fenestrations displayed typical single-layered diaphragm as noted in most species.
Descriptors: dromedarycamel eye, retinal pigment epithelium (RPE), Bruch's membrane, choriocapillaris, light and transmission electron microscopy.

Aly, KH. **Development of the mesonephros in camel (*Camelus dromedarius*).** *Zentralblatt fur Veterinarmedizin Journal der Weltvereinigung der Veterinaranatomen Reihe C Anatomia Histologia Embryologia:* 2007 Feb; 36(1): 58-61. ISSN: 0340-2096
URL: http://www.blackwell-synergy.com/issuelist.asp?journal=ahe
DOI: http://dx.doi.org/10.1111/j.1439-0264.2006.00724.x
NAL call no: SF761.Z4
Abstract: The study of the development of the mesonephros in the camel (*Camelus dromedarius*) was carried out on 16 embryos ranging from 0.9 to 8.6 cm crown vertebral rump length (CVRL). At 0.9 cm CVRL, the mesonephros is represented by a narrow strip along the roof of the thoracolumbar part of the vertebral column. At 1.4 cm CVRL, some of the mesonephric tubules are canalized but others are still solid. The mesonephric corpuscles are well developed at 1.9 cm CVRL and occupy almost the entire abdominal cavity in between the liver and the gut. Histologically, the glomeruli occupy the ventromedial aspect of the mesonephros while the mesonephric tubules become numerous, larger and more coiled. At 3 cm CVRL, the metanephros is invaginated in the caudal pole of the mesonephros, and the mesonephric tubules in some areas are differentiated into secretory and collecting tubules. At 3.5 cm CVRL the mesonephros is related dorsally to the postcardinal vein and ventrally to the subcardinal vein. At 4.7 cm CVRL continuous regression of the mesonephros from cranialwards to caudalwards is observed. At 5.3-5.5 cm CVRL, the cranial part of the meso-

nephros is divided into medial and lateral regions, and later the medial region completely disappears and is replaced by the primordium of the adrenal gland. At 8.6 cm CVRL, the caudal part of the mesonephros completely disappears.
Descriptors: dromedary camels, mesonephros development, mesonephric tubles, structure and description, invagination, caudal pole, postcardinal vein, etc.

Elmonem, MEA; Mohamed, SA; Aly, KH. **Early embryonic development of the camel lumbar spinal cord segment.** *Zentralblatt fur Veterinarmedizin Journal der Weltvereinigung der Veterinaranatomen Reihe C Anatomia Histologia Embryologia:* 2007 Feb; 36(1): 43-46. ISSN: 0340-2096
DOI: http://dx.doi.org/10.1111/j.1439-0264.2006.00716.x
NAL call no: SF761.Z4
Abstract: The lumbar spinal cord segment of the one-humped camel (*Camelus dromedarius)* embryos at 2.4- to 28-cm crown vertebral rump length (CVRL) was examined. Major changes are occurring in the organization of the lumbar spinal cord segment at this early developmental period. At first, the spinal cord is flattened from side to side but with increase in gestational age it becomes flattened dorsoventrally. The size and shape of the lumen changes in indifferent stage of development. These changes may be in relation to the decrease of ependymal layer and increase of the mantel layer during the developmental stages. The lumen of the spinal cord is a wide spindle in shape at 2.4-cm CVRL, diamond in shape at 5.5-cm CVRL and narrow oval in shape at 28-cm CVRL. It occupies about the whole, half and one-seventh of the total height of the spinal cord at 2.4-, 5.5- and 28-cm CVRL, respectively. At the 2.4-2.7 CVRL, the spinal cord is formed of six plates: roof, floor, two alar and two basal plates. The present investigation indicates that the distribution of the ependymal, mantle and marginal layers differs in the various developmental stages of the camel embryos. The majority of the cross section of the spinal cord consists at first of ependymal and mantle layers, and a thin outer rim of the marginal layer. With the advancement of age, the ependymal layer diminishes in size, while the mantle and marginal layers increase in size forming the future grey and white matters, respectively.
Descriptors: camels, embryos, crown vertebral rump length, spinal cord development, lumen, ependymal, mantle and marginal layers, growth, brain grey and white matter development.

Erden, H; Turan, E; Kara, ME. **The course of the interventricular coronary arteries and myocardial bridges in one-humped camel.** *Veteriner Fakultesi Dergisi Istanbul.* 2006; 32(3): 1-6. ISSN: 0250-2836. Note: In English with a Turkish summary.
Abstract: The aim of this study was to describe the morphology of the myocardial bridges (MCB) in one-humped camels. The hearts of 17 male wrestler one-humped camels were grouped into three according to the relationship between the course of the interventricular branches of the coronary arteries and MCB formations. MCBs were found in 6 hearts (35.29%) and were on the right and left side in one (5.88%) and 5 hearts (29.41%), respectively. The MCB widths were measured by micrometric calibre and the values were found was between 7-15 mm. These results show that both the course of the interventricular branches of the coronary arteries and the localization and existence of MCBs varying from

one individual to another in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel anatomy, heart, cardiac muscle, arteries, morphology, morphometrics, myocardium.

Jain, RK; Gupta, AN. **Topographic relations between the spinal cord segments and vertebrae in camel (*Camelus dromedarius*).** *Haryana Veterinarian*. 2007; 46: 19-21. ISSN: 0033-4359
Abstract: Bilateral retro caudal measurements of the spinal cord segments and their relations with the corresponding vertebrae were recorded in six dromedary camels. The segment length in the cervical region rapidly increased from C< sub>1</ sub> to C< sub>5</ sub> followed by a sharp decrease in length till T< sub>1</ sub>. Thereafter, the length of all the segments remained approximately constant till T< sub>12</ sub>. The lumbar region showed a remarkable decrease in the segment length from L< sub>1</ sub> to L< sub>7</ sub> followed by a gradual decrease from L< sub>7</ sub> till the termination of the spinal cord at fifth coccygeal vertebra. The transverse and vertical diameters of the spinal cord were variable through out the length. The number of rootlets was directly proportional to the transverse diameter of the spinal cord. The relations between the spinal cord segments and the body, spinous processes and the transverse processes were also recorded. Reproduced with permission of CAB.
Descriptors: dromedary camels, animal anatomy, body structure, spinal cord measurements.

Makhdoomi, DM; Shakeel Ahmad; Kirmani, MA; Banik, S; Sheikh, GN. **Physico-anatomical characteristics of Bactrian versus dromedary with special reference to Ladakh bactrian.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 166-167.
Abstract: The Bactrian of Ladakh is believed to be originated from those amongst the Bactrian of China and Mongolia. At a high altitude it got acclimatised to the environment where low oxygen tension and ambient temperatures are the main stress factors for human life to the extent that it became resistant to high altitude diseases. Accordingly the physiological and anatomical features differ from the Bactrian of Mongolia, China and dromedary camel. The paper aims to put on the record some of the physico-anatomical characteristics of Ladakh Bactrian and their comparison with the dromedary camel. Reproduced with permission of CAB.
Descriptors: LadakhBactrian camels, Bactrian camels, dromedary camels, species origins, species comparison,animal anatomy, morphology, species differences.

Patel, MK; Parnerkar, S; Wadhwani, KN; Patel, KS; Solanki, JV; Patel, AM. **Breed characteristics of Kachchhi camel.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 51-54.
Abstract: 34 villages comprising of 74 camel herds of three major thickly populated talukas of Kachchhi districts viz. Lakhpat, Bhuj and Raper surveyed for 3 consecutive seasons from March to December on 326 Kachchhi camels of different age groups to study breed characteristics of Kachchhi camel. The Kachchhi camels were light to medium in size with dark brown or reddish brown coat colour. These camels have small erect ears with tips turning in.

The camel have small and wide set muzzles and lips. Adult she camels has capacious bowl type udder and medium sized cylindrical teats. The average length of body, height at withers and heart girth was observed to be 61.17+or-1.32, 11.42+or-1.35 and 76.92+or-2.81 cm in male and 61.46+or-1.01, 109.15+or-1.13 and 72.77+or-1.58 cm in female, respectively at birth. The corresponding measurements in adult were 159.82+or-2.10, 195.00+or-3.55 and 195.93+or-2.11 cm in male and 156.15+or-0.78, 192.18+or-0.77 and 204.75+or-10.77 cm in female, respectively. The height at wither in adult camel was found to be a reliable measure for growth from its association with important body measurements. The head length at adulthood was significantly (P<0.05) higher in female than male camel but the adult males have massive head as compared to adult females. The adult male camels have significantly higher value of height at shoulder, knee, stifle and hock than female camels. The males were having significantly (P<0.05) thicker necks at one year and adult age than those of the females. Reproduced with permission of CAB.
Descriptors: Kachhi one humped camels, unique breed, characteristics, body measurements, body weight, morphology, morphometrics, sex differences, Gujarat, India.

Raji , AR ; Naserpour, M. **Light and electron microscopic studies of the trachea in the one-humped camel (*Camelus dromedarius*).** *Zentralblatt fur Veterinarmedizin Journal der Weltvereinigung der Veterinaranatomen Reihe C Anatomia Histologia Embryologia:* 2007 Feb; 36(1): 10-13. ISSN: 0340-2096
DOI: http://dx.doi.org/10.1111/j.1439-0264.2006.00709.x
NAL call no: SF761.Z4
Abstract: Histology of trachea of camel (*Camelus dromedarius*) was studied using light, scanning (SEM) and transmission electron microscopy (TEM). Tissue samples taken from the trachea (proximal, middle and distal part) were routinely prepared for histology (LM, EM) and stained with haematoxylin and eosin, Van Giesson (VG), Alcian blue, Periodic acid schiff (PAS), Masson's trichrome (MT), Verhof, PAS-VG and PAS-MT. The trachea of camel consists of 66-75 incomplete cartilaginous rings of hyaline. The lamina epithelium is composed of pseudostratified-ciliated columnar epithelium with many goblet cells. Submucosal layers were loose connective tissue with many elastic fibres. The mucosal and submucosal layers were 517.2 +/- 61.6 (So(Bm (n = 20) thick. Submucosal glands were tubuloalveolar with mucous (acidic and neutral) secretions. Trachealis muscle was attached to the inside sheet of tracheal cartilage. Ultrastructural studies showed that surface epithelium is pseudostratified with mucus-producing goblet cells, ciliated and basal cells, similar to other mammals. The ciliated cells contained many mitochondria, oval nucleus and many big granules. In scanning electron microscopy (SEM) studies, viscoelastic layers were observed on the epithelial surface of trachea, and there were highly condensed cilia under this layer.
Descriptors: camels, trachea, histological study, scanning electron microscopy, SEM, transmission electron microscopy, hyaline, mucosa, cilia.

Saeidabadi, MS.; Meybodi, MA Emami; Dordari, S. **Ultrasonographic evaluation of early fetal development in the dromedary camel** . *Reproduction in Domestic Animals.* 2007; 42(Suppl. 2): 109-110. ISSN: 0936-676. Note: "11th Annual Conference of the European Society for Domestic Animal Reproduction, Celle, Germany; September 21-22, 2007."

Descriptors: dromedary camels, early fetal development, ultrasonic imaging, echogenic technique to study embryos.

Sarmad Rehan; Qureshi, AS. **Morphometric analysis of heart, kidneys and adrenal glands in dromedary camel calves.** *Journal of Camel Practice and Research*. 2007; 14(1): 27-31. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Morphometric evaluation of the heart, kidneys and adrenal glands is critical in the determination of the aetiology and pathogenesis of different diseases related to the cardiovascular system in domestic animals as well as in human beings. In this study, the heart, kidneys and the adrenal glands of 26 dromedary camels aged between 30 to 36 months were studied gross anatomically. All organs were weighed with the help of an electrical weighing balance, whereas length, width and circumference were measured with measuring tape. Thickness of wall of the heart was measured using Vernier caliper. The shape of the heart was cone like; the coronary and longitudinal grooves were filled with white fat. Means+or-SEM of the gross anatomical parameters estimated were heart weight 1136.53+or-53.1 g, heart length from base to apex 19.54+or-0.44 cm, heart width 14.59+or-0.28 cm, coronary heart circumference 36.33+or-0.57 cm, thickness of right atrial wall 0.52+or-0.04 cm, thickness of left atrial wall 0.51+or-0.03 cm, thickness of the right ventricular wall 0.83+or-0.05 cm and thickness of the left ventricular wall 1.95+or-0.08 cm. Parameters related to kidneys gave following values: weight of left kidney 683.5+or-36 g, renal length 15.04+or-0.33 cm, renal width 10.75+or-0.24 cm, renal circumference (around the poles of kidney) 25.41+or-0.48 cm, diameter of cortex 1.26+or-0.05 cm, diameter of medulla 4.12+or-0.11 cm, weight of right kidney 725.61+or-40 g, renal length 15.54+or-0.35 cm, renal width 10.98+or-0.27 cm, renal circumference of left kidney 25.93+or-0.52 cm, thickness of cortex 1.35+or-0.04 cm and thickness of medulla 4.43+or-0.1 cm. Averages+or-SEM recorded with regard to adrenal glands were weight of left adrenal gland 16.58+or-0.8 g, length 5.15+or-0.22 cm and width 3.33+or-0.13 cm. Weight of right adrenal gland was 18.97+or-0.8 g, length 5.81+or-0.19 cm and width of right adrenal gland was found to be 3.84+or-0.11 cm. Considering these values, the dromedary camel appears to have better development of these organs than other ruminant species to cope with the stresses of the harsh climate. Reproduced with permission of CAB.

Descriptors: dromedary camels, young animals, organ morphology, adrenal glands, animal anatomy, heart, kidneys, morphology, morphometrics.

Yousefi, MH; Gilanpour, H. **Anatomical study of stifle joint in Iranian one humped camel (*Camelus dromedarius*).** In: E Camus; E Cardinale; C Dalibard; D Marinez; JF Renard; F Roger. *Proceedings of the 12 th International Conference of the Association of Institutions for Tropical Veterinary Medicine AITVM, Montpellier, France, 20-22 August, 2007 Does Control of Animal Infectious Risks Offer a New International Perspective?*Published by CIRAD. 2007; 373. ISBN: 9782876146501. Note: A conference paper.

Descriptors: dromedary camels, animal anatomy, joints of animals, stifle joint structure, morphology, radiography, Iran.

2006

Abdel Latif, M; Sharkawy, EE; Moneim, MA; Saleh, AM. **Ear configuration as a tool for identification and age determination in camel fetuses.** *Assiut Veterinary Medical Journal*. 2006; 52(111): 93-108. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: This study was conducted using 150 camel fetuses which represents the whole prenatal life. The age was represented by months and crown vertebral rump length (CVRL), with age ranging from 2.4 to 12.02 months and 2.8 cm to 108 cm CVRL. Several morphological measurements Head length (HL), Interear distance (IED), IED/HL %, Ear length (EL), Ear width (EW), ear-eye distance and ear-mouth distance were carried out. The results revealed that at age 2.4 months (2.8 cm CVRL) first branchial groove (the premordium of external ear) appeared as a growth of mesenchymal tissue surrounding oval opening. At 2.66-2.78 months (5.2-6.5 cm CVRL) the mesenchymal tissue increased in size to form two longitudinal folds, rostal and caudal. At 2.91-3.55 (8.0-15.0 cm CVRL), the caudal fold gradually increased in size forming triangular flap covering almost the external ear opening. At 3.64-4.01 months (16-20 cm CVRL) the fold reflected caudally. Morphological and biometric studies were followed on ear till full term fetuses where the external ear reached nearly its mature form.

Descriptors: dromedary camels, fetal age determination, camel fetal anatomy, ear development, biometry, body measurements, age identification, ear morphology.

Al Zghoul, M F; Ismail, ZB; Al Rukibat, RK; Al Majali, AM. **A quantitative study on the trachea of young Arabian camels (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2006; 13(2): 129-133. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The objective of this study was to report comprehensive quantitative morphometric measurements of the trachea of young camels (*C. dromedarius*). Tracheas from 15 young male camels aged between 9-12 months were used to measure the length, number of tracheal cartilage rings, inner and outer diameters and thickness of the cartilage rings at four different tracheal regions (cranial cervical, middle cervical, thoracic inlet and intrathoracic). Furthermore, the cross sectional area (CSA) of the tracheal rings were measured by a mathematical equation and a digital image analysis. The mean length of the trachea was 87+or-0.83 cm, while the mean number of the cartilage rings was 77.1+or-0.35. Diameters of the cartilage ring were smallest at the thoracic inlet region due to changes in tracheal direction and the narrow bone-surrounded thoracic inlet where the trachea enters the thoracic cavity. The ratios of the inner transverse to inner vertical and the outer transverse to outer vertical diameters ranged between 1.08-1.34. This indicates that the shape of the trachea in these young camels is near-circular. The CSA measurements obtained by the digital image analysis were 11-14% smaller than the CSA calculated by the mathematical equation ($P<0.01$). Using digital image analysis to measure the CSA of tracheal rings provides accurate and reliable measurements. The CSA and cartilage thickness were smallest and thinnest at the thoracic inlet, respectively. This may be an important predisposing factor for tracheal disorders at this region. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel anatomy, cartilage, trachea, equations, imagery, image analysis, morphology, morphometrics.

Jain, RK; Gupta, AN. **The arcuate arteries and their branching pattern in the kidney of camel (*Camelus dromedarius*).** *Haryana Veterinarian.* 2006; 45: 49-52. ISSN: 0033-4359
Abstract: The origin, course and distribution of the arcuate arteries of the kidney in adult camel were studied on 20 kidneys. The arcuate arteries arose from the interlobar arteries at the corticomedullary junction. They detached 3-5 side branches from their convex surfaces and then ended by dividing into 2-4 terminal branches. These side branches and terminal branches were present in a radiating manner and were described as the interlobular arteries. The interlobular arteries were of two types viz. radiating and deep interlobular arteries. The interlobular arteries gave off the intralobular arterioles. These intralobular arterioles were short and long and terminated into 3-4 afferent arterioles which in turn entered the glomerulus. It was concluded that the arterial blood supply to the kidneys of camel (specially the arcuate arteries and their branches) is basically similar to the other domestic animals including the two humped camel.
Descriptors: dromedary camels,animal anatomy, arteries, blood circulation, blood flow, cell structure, kidneys, morphology, blood stream, body components.

Mokhtar, AA; Osman, AHK. **Ultrastructure of the camel's pulmonary alveoli with special reference to the air-blood barrier.** *Assiut Veterinary Medical Journal.* 2006; 52(111): 1-18. ISSN: 1012-5973. Note: In English with an Arabic summary**.**
Abstract: The present study was conducted to characterize the cellular population lining the alveoli of the camel's lung. Emphasis focused on the ultrastructural findings and their reflection on the physiological role in gas exchange and transcytosis through the air-blood barrier (ABB). Ultrastructural examination with the use of electron microscope revealed that the pulmonary alveoli are lined with a continuous epithelium comprising two major cell types; the predominant, attenuated pneumocytes type I and the less popular, irregularly cuboidal pneumocytes type II. Two forms of fibroblasts were distinguished; the most remarkable feature of the first form was its well-developed and abundant rough endoplasmic reticulum. The second form was characterized by large, irregular, dark stained nucleus and little amount of cytoplasm. The most obvious feature of endothelial cells was the concentration of small vesicles (pinocytotic vesicles) adjacent to the endothelial cell membranes. They were circumscribed by a continuous basal lamina. Along the same endothelial cell, two cytoplasmic zones were existing; a thin cytoplasmic area containing few or no plasmalemma vesicles (a-vesicular area) and another thicker cytoplasmic area with numerous plasmalemma vesicles and endocytotic pits (vesicular area). Reproduced with permission of CAB.
Descriptors: dromedary camels, lungs, lung function, air sacs, respiration, respiratory gases, gas exchange, blood flow, cell ultrastructure, endoplasmic reticulum, epithelium.

Pfeiffer, CJ; Osman, AHK; Pfeiffer, DC. **Ultrastructural analysis of the integument of a desert-adapted mammal, the one-humped camel (*Camelus dromedarius*).** *Anatomia Histologia Embryologia.* 2006; 35(2): 97-103. ISSN: 0340-2096
DOI: http://dx.doi.org/10.1111/j.1439-0264.2005.00644.x
NAL call no: SF761.Z4

Abstract: In this study, we conducted a light microscopic and ultrastructural analysis of the integument of the one-humped camel (*Camelus dromedarius*). In general, the epidermal strata of the camel integument appeared typical of those found in non-desert mammals. Two cell populations were noted in the stratum basale: one with a flat, non-serrated base and the other with a highly serrated base. Typical fine structure was observed in keratinocytes of the stratum spinosum and stratum granulosum. The stratum corneum was six to 10 cells thick. Within the different strata, overall cell morphologies and the general distribution and relative abundance of cellular organelles appeared typical. Dermal features included the presence of myoepithelial cells surrounding apocrine tubular glands. Inter- or intracellular canaliculi within the secretory cells of the apocrine glands, reported to be present in certain other non-desert mammals, were not evident in the camel. Together, these data indicate that while the camel is clearly adapted for a desert lifestyle, these adaptations do not include significant specializations at the cellular or subcellular level in the integument. Reproduced with permission of CAB.
Descriptors: dromedary camels, skin, skin glands, epithelium, integument, keratinocytes, skin tissue ultrastructure.

Sarmad Rehan; Qureshi, AS. **Microscopic evaluation of the heart, kidneys and adrenal glands of one-humped camel calves (*Camelus dromedarius*) using semi automated image analysis system.** *Journal of Camel Practice and Research.* 2006; 13(2): 123-127. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Morphometric parameters of the heart, kidneys and adrenal glands of 26 young dromedaries aged 30-36 months were evaluated. Measurements were made using the image analysis software programme Autocad R. Among heart parameters, volumes of the cardiac nuclei of the right atrium, left atrium, right ventricle and left ventricle were 141.9+or-6.6, 138.8+or-7.24, 151.6+or-7.4 and 151.8+or-7.0 micro m3, respectively. Means of connective tissue percentage in the right atrium, left atrium, right ventricle and left ventricle of the heart were 8.0+or-0.3, 7.7+or-0.3, 7.3+or-0.3 and 6.8+or-0.32, respectively. Among the kidneys, mean diameters of the subcapsular and juxtamedullary glomeruli were 110 and 87.3 micro m, mean volumes of the subcapsular and juxtamedullary glomeruli were 1328x103 and 630x103 micro m3, while the mean areas of subcapsular and juxtamedullary glomeruli were 11.9x102 and 7.6x103 micro m2, respectively. Statistical analysis revealed that the glomeruli of subcapsular region were significantly higher than those of juxtamedullary region. Among the adrenal glands, volume of the nuclei of zona glomerulosa was 92.7+or-4.2 micro m3 and thickness of zona glomerulosa was 1139+or-139 micro m. Reproduced with permission of CAB.
Descriptors: dromedary camels, adrenal glands, kidneys, glomerulus, heart ventricles, imagery, image analysis, histology, morphometrics.

2005

Abshenas, J; Molaei, MM; Vosough, D. **Ultrasonographic method for anatomic study of the udder and teat in camel (*Camelus dromedarius*)**. *Reproduction in Domestic Animals.* 2005; 40(4): 367. ISSN: 0936-6768. Note: "9th Annual Conference of the European Society for Domestic Animal Reproduction (ESDAR), Murcia, Spain; September 01-03, 2005."
URL: http://www.wiley.com/bw/submit.asp?ref=0936-6768
NAL call No: SF105.A1Z8
Descriptors: dromedary camels, udder and teat anatomy, ultrasound imaging, diagnostic technique, clinical techniques.

Alzghoul , MB . **A quantitative study on the trachea of young camels (*Camelus dromedarius*).** *Veterinary Medical Journal Giza.* 2005; 53(2): 731. ISSN: 1110-1423. Note: "Proceedings of the 8th Scientific Conference: Biotechnology & Animal Wealth Development, Giza, Egypt. 17-19 April, 2005."
Descriptors: dromedary camels, young camels, camel anatomy, trachea, body measurements, morphometrics.

Arencibia, A; Rivero, MA; Gil, F; Ramirez, JA; Corbera, JA; Ramirez, G; Vazquez, JM. **Anatomy of the cranioencephalic structures of the camel (*Camelus dromedarius* L.) by imaging techniques: a magnetic resonance imaging study.** *Anatomia Histologia Embryologia*. 2005; 34(1): 52-55. ISSN:
DOI: http://dx.doi.org/10.1111/j.1439-0264.2004.00572.x
Abstract: The objective of this study was to define the anatomy of the cranioencephalic structures and associated formations in camel using magnetic resonance imaging (MRI). MR images were acquired in sagittal, transverse and oblique dorsal planes, using spin-echo techniques, a magnet of 1.5 T and a standard human body coil. MR images were compared with corresponding frozen cross-sections of the head. Different anatomic structures were identified and labelled at each level. The resulting images provided excellent soft tissue contrast and anatomic detail of the brain and associated structures of the camel head. Annotated MR images from this study are intended to be a reference for clinical imaging studies of the head of the dromedary camel. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel anatomy, head images, cranioencephalic structures, brain, cerebrum, image processing, imagery, magnetic resonance imaging, morphology, techniques.

Derar, DRI; Hussein, HA; Saleh, AM. **Morphometric and immunohistochemical variations in the camel (*Camelus dromedarius*) testis in relation to some endocrinological aspects during different seasons of the year.** *Assiut Veterinary Medical Journal.* 2005; 51(104): 273-287. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: Seasonal variation in serum testosterone, thyroxine and the testicular morphology were studied in 54 sexually mature and apparently healthy one-humped camels during the different seasons of the year. The testosterone and thyroxine serum levels were measured and 3 beta -hydroxysteroid dehydrogenase (3 beta -HSD) activity of Leydig cells was assessed immunohistochemically to aid in the interpretation of results. The activity of 3 beta -HSD

was high during cold months and severely depressed with minimum activity in hot months. Concomitantly, serum testosterone and thyroxine levels increased during the winter and early spring and decreased thereafter. Their levels reached the peak during the months of January until April. These results suggested that 3 beta -HSD was a key enzyme in the regulation of the testosterone production in Leydig cells of the male dromedary. Thyroxine was a crucial hormone for the male reproductive activity during the breeding season in the dromedary and fluctuated in the same pattern as serum male androgen.
Descriptors: dromedary camels, male camels, morphology, morphometrics, testes, testicles, androgens, testosterone, thyroxine, enzyme activity, hydroxysteroid dehydrogenase, Leydig cells, seminiferous tubules, seasonal variation, seasonal fluctuations.

Elmonem, MEA; Mohamel, SA; Aly, KH. **Early embryonic development of the camel lumbar spinal cord segment.** *Assiut Veterinary Medical Journal.* 2005; 51(106): 1-11. ISSN: 1012-5973 Note: In English with and Arabic summary.
Abstract: The lumbar spinal cord segment of camel embryos (n=24) at 2.4 to 28 cm CVRL was examined. Major changes occurred in the organization of the lumbar spinal cord segment at this early developmental period. At the 2.4, 2.7 and 3.6 cm CVRL, the 3 primary layers (ependymal, mantle and marginal cells) in the developing lumbar spinal cord segment were demonstrated. The mantle layer was the first to show striking differentiation, whereas the marginal layer was represented by a thin outer rim. Proliferation and differentiation of the neuroepithelial cells in the developing spinal cord produced thick lateral walls, thin roof and floor plates. The spinal ganglion and dorsal root of the spinal nerve were differentiated. At 2.7 cm CVRL, differential thickening of the lateral walls produced a shallow longitudinal groove called sulcus limitans, which separated the dorsal part (alar plate) from the ventral part (basal plate). The ventral root of the spinal nerve and the spinal cord ganglion were embedded in loose mesenchyme that tended to differentiate into spinal meninges. At 3.6 cm CVRL, the basal plate, which was the future ventral grey horn was seen to be quite voluminous, and the dorsal and ventral roots united to form the beginning of the spinal nerve. At 5.5 cm CVRL, the alar plates enlarged, forming the dorsal septum. At 8.4-10.5 cm CVRL, the basal plates enlarged and bulged ventrally on each side of the midline, producing the distinct ventral median fissure. The white and grey matters could be recognized. At 28 cm CVRL, the lumen of the spinal cord differentiated into the central canal bounded dorsally and ventrally by the dorsal and ventral grey commissures, therefore the grey matter took the appearance of a butterfly. The lumbar spinal nerve and their roots were well distinct.
Descriptors: dromedary camels, embryo growth and development, cell differentiation, cells, embryonic development, embryos, epithelium, ganglia, meninges, peripheral nerves, spinal cord, cell proliferation, cytodifferentiation, nerves.

Gurdial Singh; Nagpal, SK; Sanjeev Kumar. **Scanning electron microscopic studies on the female genitalia of camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2005; 12(1): 21-25. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The present study was conducted to observe the genitalia of 3 adult female camels using scanning electron microscopy. The oviduct was mainly lined with ciliated and nonciliated cells whose pattern varied in the different segments. The uterus and the uterine horns

were mainly lined with nonciliated cells, however, few ciliated cells were also seen. A large number of glandular openings were also observed. The cervix had very few ciliated cells while, the vagina had no ciliated cells. The distribution and number of mucosal folds also varied amongst the different segments. Reproduced with permission of CAB.
Descriptors: dromedary camels, female genital system, cervix, female genitalia, oviducts, uterus, vagina, fallopian tubes, salpinges, uterine tubes, scanning electron microscopy, histology. morphology.

Imam, HMA. **Early embryonic development of the camel metanephros.** *Assiut Veterinary Medical Journal.* 2005; 51(106): 12-20. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: This study was conducted to investigate the development of the one-humped camel metanephros. 15 embryos ranging from 2.4 cm to 7.8 cm CVRL were used in this study. The metanephros was observed first at 2.6 cm CVRL, consisting of uretric bud surrounded by metanephrogenic tissue. At 2.8 cm CVRL, the metric bud was divided into 4 generations which were caped by metanephrogenic tissue. At 3 cm CVRL, the metanephros was invaginated in the caudal pole of the mesonephros. At 5.3-5.5 cm CVRL, the metanephros continuously enlarged and differentiated. Moreover, it contained 3 concentric rows of metanephric corpuscles, and the degree of differentiation increased from outward to inward. At 6 cm CVRL, the metanephros had metanephric corpuscles, proximal and distal convoluted tubules and collecting tubules. Reproduced with permission of CAB.
Descriptors: dromedary camels, kidney development in the embryo, cell differentiation, embryonic development, embryo morphology, ureter.

Ingole, SP; Dhingra, LD; Jain, RK; Tiwari, SK; Mishra, OP. **Nerve supply to the manus region in camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2005; 12(1): 47-51. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to study the detailed course, relationship and supply of the nerves innervating the manus region of the camels. Manus regions of 10 embalmed single humped adult camels revealed that the nerves innervating this region was a continuation of musculocutaneous, radial, ulnar and median nerves of the brachial plexus. The medial cutaneous antebrachial nerve of the musculocutaneous nerve descended to the dorsomedial aspect of the carpus. The cranial division of the lateral cutaneous antebrachial nerve through its lateral subdivision formed the dorsal common digital nerves II and III at the middle of the metacarpus. The nerve entered the manus region mainly as dorsal and palmar branches and both continued as dorsal nerve and palmar common digital nerve IV, respectively. The medial nerve, after passing through the carpal canal to manus region, ended into two divisions, palmar common digital nerve II and a lateral branch, 19-21 cm distal to the accessory carpal. The lateral branch divided into a communicating branch to palmar common digital nerve IV and palmar axial proper digital nerve IV. The later nerve and the palmar axial proper digital nerve III, the digital continuation of palmar common digital nerve II, united to form a common digital nerve III which was 4-10 cm in length. The palmar common digital nerve II or in some cases, the median nerve itself branched to dorsal common digital nerve II. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel anatomy, blood circulation, brachial plexus, carpus, morphology, peripheral nerves, blood stream, body components, nerves.

Shahid, RU; Kausar, R. **Comparative gross anatomical studies of the skull of one-humped camel (*Camelus dromedarius*).** *Pakistan Veterinary Journal.* 2005; 25(4): 205-206. ISSN: 0253-8318

Abstract: The skull of camel when viewed from above was irregularly pentagonal in outline. It was widest in the frontal region and contained the orbits laterally. The occipital bone formed the entire nuchal surface and encroached upon the dorsal surface about 1.75 to 2 inches. It joined the parietal bone at transverse suture. A rough transverse ridge separated the parietal and nuchal surfaces. The mastoid foramen was very large and situated in a deep fossa in the occipital bone in contrast to ox, where it lay at the junction of occipital and temporal bones. The cornual processes were absent. The supraorbital foramen was in the form of a deep fissure, at the rostrolateral margin of the orbit. There was no maxillary tuberosity and facial crest. The pre maxilla had a dorsomedially concave and narrow pointed body. The nasal bones were notched rostromedially and nasal apertures were oval in outline. The body of mandible was long, narrow and concave dorsomedially. The intermandibular space was "V" shaped. The vertical ramus of mandible was thin and convex caudally and the angles were not pronounced, while the rostral border was thick and wide. The coronoid process was almost straight with caudal end slightly pointed. The condyliod process was large and its dorsal surface contained the extensive articular surfaces, which were convex. There was a shallow mandibular notch. The mandibular foramen was in the middle of the medial surface of the ramus of mandible. Reproduced with permission of CAB.

Descriptors: dromedary camels, skull anatomy, camel anatomy, bone sutures, occipital bone, nasal bones, mandibles, morphology, condyloid process, corneal process.

2004

Arencibia, A; Rivero, MA; Ramirez, JA; Gil, F; Gutierrez, C; Oros, J; Latorre, R; Vazquez, JM**. Magnetic resonance imaging of the normal brain in a newborn dromedary camel.** *Veterinary Journal.* 2004 Nov; 168(3): 353-357. ISSN: 1090-0233

DOI: http://dx.doi.org/10.1016/j.tvjl.2003.06.001
NAL call no: SF601.V484

Descriptors: dromedaries, neonates, brain, magnetic resonance imaging, animal morphology.

Garey, Laurence; Mensah Brown, Eric. **The brain of the camel, *Camelus dromedarius*: a study of a possible pain-inhibiting pathway.** *Tribulus.* 2004 Spring-Summer; 14(1): 12-17. ISSN: 1019-6919

Descriptors: dromedary camels, *Camelus dromedarius*, brain, pain inhibiting pathway characterization, midbrain superior colliculus, morphology.

Goswami, P; Purohit, GN; Gupta, ML. **Biometry of camel (*Camelus dromedarius*) spermatozoa and their morphological abnormalities.** *Indian Journal of Animal Sciences.* 2004; 74(10): 1049-1050. ISSN: 0367-8318

Descriptors. dromedary camels, spermatozoa, morphometrics, semen, biometry, abnormalities, midpiece, morphology, morphometrics.

Jain, RK; Gupta, AN. **Arterial supply of the fetlock, pastern and coffin joints of fore limb in camel (*Camelus dromedarius*).** *Haryana Veterinarian.* 2004; 43: 15-18. ISSN: 0033-4359

Abstract: Arterial supply of the fetlock, pastern and coffin joints was studied in 8 dromedary camels. The arterial branches supplying the fetlock joint were derived from the palmar common digital artery III, dorsal common digital artery III, palmar proper axial digital artery III, palmar proper axial digital artery IV, palmar proper abaxial digital artery III, palmar proper abaxial digital artery IV and distal deep palmar arch. The arterial branches supplying the pastern and coffin joints were derived from the palmar proper axial digital artery III, palmar proper axial digital artery IV, palmar proper abaxial digital artery III and palmar proper abaxial digital artery IV. Reproduced with permission of CAB.

Descriptors: dromedary camels, fetlock joint, pastern joint, coffin joint, circulatory system, arteries, blood circulation, blood flow.

Khamas, WA ; Nour, AYM. **The peculiarities of stomach of the one-humped camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2004; 11(1): 21-26. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: This study was conducted to investigate and describe the gross, light and electron microscopical peculiarities of the stomach of the one-humped camel and to relate these peculiarities with their functions. 13 complete stomachs of adult one-humped camel (*Camelus dromedarius*) were collected from the slaughterhouse. The samples were brought to the laboratory within 2 h, cleaned, photographed and fixed in different fixatives for gross, light and electron microscopic studies. Fixation, processing and staining were carried out following standard histological procedures. Moreover, 3 embalmed, dissected and dried camels were studied and photographed. The stomach of the camel was of the multilocular compound type. The rumen and the considerably reduced reticulum comprised one compartment (C1) and the omasum (C2) and abomasum (C3) comprised the other two. All the 3 compartments were glandular. Non-glandular regions were found only in the rumen part of C1. The peculiar cellulae (previously called water sacs) in the wall were arranged in rows in the dorsal and ventral sacs of the rumen. The gastric groove ventral lip was formed by the right longitudinal pillar, which bound the ventral part of the dorsal cellulae. The left longitudinal groove and pillar were absent. Histologically, there was no lamina muscularis mucosa in the wall, except in the regions of the cellulae where a thin smooth muscle layer was present. The omasum had one type of lamellae (laminae) and was lined with simple columnar epithelium and contained simple straight tubular glands in its wall. The abomasum was very extensive and folded inside. The parietal cells were found to be higher in number compared to other cell types. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel anatomy, stomach, abomasums, gastric glands, histology, morphology, omasum, reticulum, rumen, rumen epithelium, lamellae.

Nili, H; Mesbah, F; Kafi, M; Esfahani, MHN. **Light and transmission electron microscopy of immature camelus dromedarius oocyte** . *Anatomia Histologia Embryologia.* 2004; 33(4): 196-199. ISSN: 0340-2096

URL: http://www.blackwell-synergy.com/issuelist.asp?journal=ahe

DOI: http://dx.doi.org/10.1111/j.1439-0264.2004.00536.x

NAL call no: SF761.Z4

Abstract: In order to provide a consistent system for laboratory production of embryos, the characteristics of immature camel oocyte must first be described. The objective of this study was to define ultrastructural features of immature camel oocyte. Ovaries were obtained from camels at a local abattoir, and then transported to the laboratory within 2 h. *Camelus* cumulus oocyte complexes (COCs) were aspirated from 2-6 mm follicles using a 22-gauge needle. Excellent and good quality COCs were selected and prepared for transmission electron microscopy study using a cavity slide. The fine structure of camel oocyte is morphologically similar to that of other mammalian oocytes. However, some minor differences exist between COC of camel and other mammalian species. Different size and shape of membrane-bound vesicles, lipid droplet, mitochondria and cortical granules were distributed throughout the ooplasm. Discrete or in association with endoplasmic reticulum, Golgi complexes were observed in the periphery of the oocytes. The majority of the oocytes were in the germinal vesicle stage.

Descriptors: dromedary camels, immature embryos, camel anatomy, cell ultrastructure, cumulus oophorus, electron microscopy, post slaughter harvesting.

Zayed, AE. **Anatomical, scanning electron and light microscopical studies on the prenatal development of the nasal conchae of the one-humped camel (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal.* 2004; 50(100): 17-36. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: A total of 35 camel fetuses were studied to investigate the anatomy, scanning electron and light microscopy of the nasal conchae of the camel during the prenatal life. The dorsal, middle and ventral nasal conchae were recognized microscopically as early as 4.2 cm CVRL in the form of three evaginations from the lateral wall of the nasal cavity. From being clearly visible grossly (at 17 cm CVL), the nasal conchae demonstrated little gross changes which were restricted to an increase in the length of their spiral lamellae and consequently the size of their recesses and sinuses. In full-term fetuses (105 cm CVRL), the dorsal concha was represented by basal lamella rostrally, but caudally it formed the dorsal conchal sinus. The ventral concha has two spiral lamellae arranged as dorsal and ventral ones rostrally, but caudally they rearranged themselves as medial and lateral respectively. The middle concha enclosed a large middle conchal sinus. Scanning electron and light microscopy revealed number of transformations in the surface epithelium of the nasal conchae in both respiratory and olfactory regions. The surface cells that acquire microvilli and short cilia in earlier stages started to be sloughed and replaced by the underlying cells around 15 cm CVRL. By light microscopy, these sloughing cells appeared with pyknotic nuclei and vacuolated cytoplasm. From 50 cm CVRL to full-term fetuses, the covering epithelium of the nasal conchae demonstrated regional variations in the distribution of ciliated and microvillous cells. In the most rostral part, the two cell types partake the surface. The ciliated cells increased gradually at the expense of the microvillous cells on approaching the olfactory region, where the ciliated

cells were dominating. With exception of the presence of bleb-like apical protrusions amidst the ciliated surface of the olfactory epithelium, both olfactory and caudal areas of respiratory epithelia have the same picture of their massively-ciliated surface. Light microscopically, the respiratory and olfactory epithelia were easily differentiated as early as 5.8 cm CVRL. At 8-12 cm CVRL, the respiratory epithelium was very thin (about 28 micro m) when compared with the thick olfactory epithelium (about 67 micro m) at this stage. From mid-gestation (50 cm CVRL) and on, both epithelial types were pseudostratified columnar ciliated in nature, but the respiratory epithelium demonstrated many goblet cells. The olfactory epithelium, on the other hand lacked goblet cells but the olfactory cilia were characterized by vesicular swellings. In full term fetuses, the olfactory epithelium was characterized by flask-shaped crypts containing 5-8 bipolar sensory cells. In conclusion, the nasal cavity of the camel as a desert animal has number of peculiar features, of these is the presence of numerous goblet cells and mucous secreting glands in the surface epithelium of the nasal conchae. In addition the nasal vestibule has collection of long hairs in its cutaneous lining.
Descriptors: dromedary camels, fetal development, animal anatomy, body components, epithelium, nose, scanning electron microscopy.

Zayed, AE. **The prenatal development of the eyelids of the one-humped camel (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal.* 2004; 50(100): 37-52. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: A total of 55 camel fetuses ranging from 2.8 to 110 cm crown vertebral rump length (CVRL) were studied. Thirty-five fetuses were studied for gross morphology and the other twenty for paraffin sectioning and light microscopy. The upper and lower eyelids appeared as two ectodermal folds at 2.8 cm CVRL, then grew until they meet and fuse at 8.4 cm CVRL. Fusion lasted until 58 cm CVRL, the lids then start to reopen at 66 cm CVRL. The palpebral skin and conjunctiva display striking changes throughout the prenatal life. The first indication of hair follicles was seen at 8.4 cm CVRL, while sweat and sebaceous glands were first demonstrated in fetuses of 36.5 cm CVRL. A cornified palpebral skin with complete cutaneous structures including eyelashes and tactile hairs was demonstrated in fetuses of 66 cm CVRL. The one-humped camel lacked tarsal glands. However, hair follicles were demonstrated on the conjunctival side of the eyelids, only near the medial canthus, in fetuses of 36.5 cm CVRL. At 110 cm CVRL (full-term fetuses), this part of the palpebral conjunctiva appeared hairy and associated with well-developed sebaceous glands. Reproduced with permission of CAB.
Descriptors: dromedary camels, eyelids, fetal development, microscopy, morphology.

Arabian: Cestodes Diseases

2008

Barton , MA. **Nasal and gastro-intestinal parasites of the camel (*Camelus dromedarius*) from central Australia.** *Transactions of the Royal Society of South Australia.* 2008; 132(Part 1): 40-42. ISSN: 0372-1426
Descriptors: 289 dromedary camels, nasal bot fly, *Cephalopina titillator*, gastrointestinal nematode parasites, *Cooperia pectinata*, *Nematodirella dromedarii*, disease survey, levels of infection, Australia.

Bekele, Samuel T. **Gross and microscopic pulmonary lesions of camels from Eastern Ethiopia.** *Tropical Animal Health and Production.* 2008 Jan; 40(1): 25-28. ISSN: 0049-4747
URL: http://dx.doi.org/10.1007/s11250-007-9046-9
NAL call no: SF601 .T7
Abstract: Camels are important animals for pastoralists in the northeastern, eastern, south-eastern and southern parts of Ethiopia. This paper reports on abattoir study of respiratory lesions in 104 adult camels at the Dire Dawa abattoir (88 male and 16 female). The study showed 98% of the examined lungs had one or more lesions. The most common lesions were pulmonary fibrosis (50.00%), pneumoconiosis (34.62%), hydatid cyst (30.80%), pulmonary abscess (3.85%) and parasitic bronchopneumonia (0.96%). The distribution of pneumoconiosis and hydatid cyst varied significantly ($p < 0.05$) among different lobes, the highest being seen in the caudal lobe. For the different lesions there was no significant ($p > 0.05$) difference in distribution among male and female camels. Possible explanations for the occurrence of the lesions are discussed. And recommendations forecasted are made.
Descriptors: camels, adult animals, post slaughter sampling, respiratory lesions, pulmonary fibrosis (50.00%), pneumoconiosis (34.62%), hydatid cyst (30.80%), pulmonary abscess (3.85%), parasitic bronchopneumonia, Ethiopia.

Haroun, EM; Omer, OH; Mahmoud, OM; Draz, A. **Serological studies on hydatidosis in camels in Saudi Arabia.** *Research Journal of Veterinary Sciences.* 2008; 1(1): 71-73. ISSN: 1819-1908
URL: http://www.academicjournals.net/fulltext/rjvs/2008/71-73.pdf
Abstract: Two hundred camels sacrificed in Al-Muasim Abattoir at Mekka Al-Mukarama were examined for hydatidosis. Out of these, 32 (16.0%) were found to harbour hydatid cysts either in the liver, lung or both. From the latter, only two camels (6.3%) harboured fertile hydatid cysts. Twelve (37.5%) of the 32 camels found harbouring hydatid cysts were serologically positive when screened for hydatidosis by the indirect haemagglutination test (IHA). Two animals (1.2%) out of the 168 non-infected camels gave serologically false positive results. Cysticercosis was recorded in five camels (2.5%).
Descriptors: camels, post slaughter disease screening research, abattoirs, liver screening, lungs screening, hemagglutination tests, cestode infections, cestode larvae, cysticercosis, hydatids, infections, serology, false positive results, Saudi Arabia.

Oryan, A; Valinezhad, A; Bahrami, S. **Prevalence and pathology of camel filariasis in Iran.** *Parasitology Research.* 2008; 103(5): 1125-1131. ISSN: 0932-0113

Descriptors: 1070 camels, males, females, varying ages, post slaughter sampling, *Dipetalonema evansi* infection levels, blood smears, testicles, epididymises, spermatic cords, lungs, arteries, chronic orchitis, infiltration of white blood cell types, necrosis in pulmonary parenchyma, interstitial pneumonia, mineralization of blood vessel walls, high morbidity, impaired working ability, lowered productivity, Iran.

Thompson, RCA. **The taxonomy, phylogeny and transmission of *Echinococcus.*** *Experimental Parasitology.* 2008 Aug; 119(4): 439-446. ISSN: 0014-4894. Note: In the special issue: "Experimental Studies in Echinococcosis" edited by A. Hemphill and P. Kern.

DOI: http://dx.doi.org/10.1016/j.exppara.2008.04.016

NAL call no: 436.8 Ex7

Abstract: The application of molecular tools to the characterisation of the aetiological agents of echinococcosis has revealed a series of largely host-adapted species and genotypes that are maintained in distinct cycles of transmission. They can be defined on both genetic and phenotypic characteristics which complement previous observations made by descriptive parasitologists many years ago. A revised taxonomy for species in the genus *Echinococcus* has been proposed and widely accepted, particularly with respect to forms maintained in transmission cycles involving sheep, horses and cattle. However, molecular epidemiological studies are required in a number of endemic areas in order to determine cycles of transmission responsible for maintaining the parasite. The taxonomic status of forms in cervids, pigs and camels has still to be resolved, and the status and epidemiological significance of newly described species in China requires further research.

Descriptors: cervids, camels, pigs, sheep, horses, cattle, molecular epidemiological studies, *Echinococcus,* etiology, parasites, life cycles, transmission, genetic and phenotypic characteristics, taxonomic status of parasite, newly discovered species in China.

Utuk, AE; Simsek, S; Koroglu, E; McManus, DP. **Molecular genetic characterization of different isolates of *Echinococcus granulosus* in east and southeast regions of Turkey.** *Acta Tropica.* 2008; 107(2): 192-194. ISSN: 0001-706X

Abstract: We used PCR-RFLP analysis of ribosomal ITS1 fragment using four different restriction enzymes and DNA sequencing of mitochondrial CO1 gene to investigate the genetic characteristics of isolates of *Echinococcus granulosus* obtained from different hosts (179 sheep, 19 cattle, 7 goat, 1 camel, 1 dog and 1 human) and regions (Elazig, Malatya, Erzurum, Van, Diyarbakir and Sanliurfa) of Turkey. The report represents the most comprehensive genotypic investigation of *E. granulosus* isolates undertaken in Turkey, with Turkish samples of cattle, goat, camel, and dog origin being characterized for the first time. We show that the predominant genotype involved in *E. granulosus* transmission in Turkey is the common sheep strain (G1 genotype) infecting humans, cattle, sheep, goats, camels as well as the dog definitive host. Nevertheless, we urge that coordinators of local control programs in Turkey should take into consideration the potential occurrence and risk of additional strains of *E. granulosus* infecting humans and animal hosts, and plan accordingly.

Descriptors: cattle, dogs, goats, sheep, humans, *Echinococcus granulosus*, disease transmission,

echinococcosis infection, pathogen strains, biochemical genetics, genes, genotypes, molecular genetics, zoonotic diseases, hydatid disease, hydatidosis, disease prevention, Turkey.

2007

Amer, HA; Nibal, AH; Dalal, SM; Hassan, HM. **Pathological and serological studies on cystic exhinococcosis in naturaly infected camel calves.** *Veterinary Medical Journal Giza.* 2007; 55(1): 115-129. ISSN: 1110-1423. Note: In English with an Arabic summary.
Abstract: Hydatid cyst-infected lung and liver specimens (60 and 10, respectively) of camel calves (about 12-18 months old) were collected from the Kerdasa abattoir in Giza governorate from January to August 2004. These specimens were subjected to parasitological and pathological examinations. Blood samples were also taken from each camel calf for serological study. Parasitological results showed that the infection rate with hydatid cysts in lungs was more than that in liver. Moreover, the fertility of these cysts was 75% in lungs and 60% in liver. Serological results proved that there were variable degrees of positivity that correlated in parallel to the gross findings of infected lungs and liver with hydatid cysts, indicating different stages of parasitic infection. Pathological findings showed a significant host tissue response in the form of mononuclear cell infiltration and fibroblastic proliferation (medium sized cysts). Furthermore, the tissue surrounding the fertile cysts showed hyalinization. Histopathological and serological examinations must be applied to hydatid cyst control programmes, particularly in young animals.
Descriptors: dromedary camels, post slaughter monitoring, cystic echinococcosis, disease control, fertility, histopathology, liver, lungs, serology, unilocular hydatids, *Echinococcus granulosus,* Egypt.

Aoun, K; Bouratbine, A. **Actualites epidemiologiques de l'hydatidose en Tunisie. [Current epidemiological data on hydatidosis in Tunisia.]** *Medecine et Maladies Infectieuses.* 2007; 37(Supp. 1): S40-S42. ISSN: 0399-077X. Note: 8es Journees Nationales d'Infectiologie, Dijon, France, 13-15 June 2007. In French.
Abstract: *Echinococcus granulosus* affects 15 out of every 100 000 people, resulting in an economic loss of approximately US$ 15 million/year. Up to 21% of dogs are infected, while the average infection rate in sheep flocks is 40%, 14% in cattle, and 7.5% in camels. Factors influencing the spread of this disease are discussed including the high numbers of livestock and dogs, lack of hygienic slaughter conditions (no burning of infected carcasses at present), and insufficient health education. Reproduced with permission of CAB.
Descriptors: camels, cattle, dogs, humans, sheep, *Echinococcus granulosus,* post slaughter survey, abattoir sanitation, livestock diseases, zoonotic disease, human health risks, health care costs, helminthes, hygiene, disease levels in livestock, slaughter, parasite transmission and spread, Tunisia.

Aypak, S. **Develerin helmint enfeksiyonlar. [Helminth infections of camels.]** *Turkiye Parazitoloji Dergisi.* 2007; 31(3): 225-228. ISSN: 1300-6320. Note: In Turkish with an English summary. A review.
URL: http://www.tparazitolderg.org

Abstract: Camels, which are indispensable under Asia and Africa's bad climatic and geographic conditions, are bred in Turkey for tourist purposes, including wrestling. Even though they have been used for thousands of years, comprehensive studies addressing the parasitic diseases of these animals have been performed only during recent years. In this review, helminth infections seen in the camel and their treatment are discussed. Reproduced with permission of CAB.
Descriptors: camels, parasitic diseases, helminth infections, anthelmintics, drug therapy, parasites, parasitoses, Turkey.

El Bahy, MM; El Bahy, NM; Shalaby, HA. **Value of *Haemonchus longistipes* purified antigens in diagnosis of gastro-intestinal nematodes infection in camels.** *Pakistan Journal of Biological Sciences.* 2007; 10(9): 1452-1458. ISSN: 1028-8880
URL: http://www.ansinet.org/pjbs
Abstract: Fractionated *Haemonchus longistipes* crude antigen revealed 7 protein fractions at molecular weights of 93, 74, 67, 56, 32, 26 and 16 kDa. The bands at 56, 32 and 26 kDa reacted specifically with *H. longistipes* hyper-immune sera prepared in rabbit (1:100 dilution) using EITB technique. The eluted concentrated fractions as well as crude worm antigens were used in diagnosis of natural infection of Gastro-Intestinal Nematodes (GIN) only or associated with other parasites in camels using ELISA technique. *H. longistipes* crude antigen and fraction of 26 kDa induced high sensitivity in diagnosis of infection in animals harbouring GIN only (sensitivity was 95-100%), while it was 85.0-93.3% with 32 kDa fraction and 55.5-73.3% with that of 56 kDa using ELISA technique. The two *H. longistipes* eluted protein fractions of 26 and 32 kDa showed higher sensitivity than their crude antigens in diagnosis of GIN infection mixed with other parasites. While, Protein bands of 26 kDa appeared more sensitive than the other protein bands in detection of anti-*H. longistipes* antibodies at higher serum dilution. With special superiority for fraction of 26 kDa, in comparison with the other antigens, sharp specificity or sensitivity in diagnosis, could not be achieved in this study especially in case of mixed infection with other parasites, where these animals might be immune-compromised. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Haemonchus longistipes*, infection, gastro-intestinal nematodes, *Secernentea*, *Strongylida,* mixed infections, antigens, diagnosis, ELISA, parasites, purification, Pakistan.

Lotfi, A; Shahriar, HA. **Present situation of hydatidosis in animals in the Middle East and Arabic North Africa: a review.** *Journal of Animal and Veterinary Advances*. 2007; 6(9): 1051-1054. ISSN: 1680-5593. Note: A literature review.
Abstract: Hydatidosis is one of the parasitic diseases in different parts of the world such as middle-east. The most kinds of infected animals are sheep and camels at this region. Infection has geographical distribution in most of countries. So, in central parts, hydatidosis rate is less than frontier bands. Most of the cysts to be found in older animals that hadn't any immunity with age promotion than hydatid cyst. Cysts of the buffaloes and camels are often as fertile but other ones found in small ruminants were as infertile. Recently, statistics has been shown high level of infection in north of the Africa (as especially for the camels), central Asia and middle-east. Due to high rate of hydatidosis in eastern countries of the Europe, most of the

geographical distribution of the cyst to be found well. Thus, controlling programs of hydatidosis must be done in care widely. Reproduced with permission of CAB.
Descriptors: buffaloes, sheep, camels, hydatidosis, parasitic disease, cysts pathological, *Echinococcosis*, Europe, Middle East; North Africa.

Maillard, S; Benchikh Elfegoun, MC; Knapp, J; Bart, JM; Koskei, P; Gottstein, B; Piarroux, R. **Taxonomic position and geographical distribution of the common sheep G1 and camel G6 strains of *Echinococcus granulosus* in three African countries.** *Parasitology Research.* 2007; 100(3): 495-503. ISSN: 0932-0113
Abstract: The taxonomic and phylogenetic status of *Echinococcus granulosus* strains are still controversial and under discussion. In the present study, we investigated the genetic polymorphism of *E. granulosus* isolates originating from three countries of Africa, including a region of Algeria, where the common G1 sheep and the camel G6 strains coexist sympatrically. Seventy-one hydatid cysts were collected from sheep, cattle, camels, and humans. Two mitochondrial markers (cox1 and nad1) were used for strain identification. Two nuclear markers (actII and hbx2) were used to study the possible occurrence of cross-fertilization. Despite the heterogeneity observed among the G1 isolates, they were all localized within one robust cluster. A second strong cluster was also observed containing all of the G6 isolates. Both strains appeared as two distinct groups, and no cases of interbreeding were found. Thus, the attribution of a species rank can be suggested. We also found the Tasmanian sheep G2 strain for the first time in Africa. Because of the slight variations observed between the common sheep and the Tasmanian sheep strains, further studies should be carried out to elucidate the epidemiological relevance of this genetic discrimination. Reproduced with permission of CAB.
Descriptors: dromedary camels, sheep, humans, cattle, pathogen isolates, *Echinococcosis granulosus,* hydatid disease, hydatidosis, systematics, zoonotic infections, genes, genetic polymorphism, phylogenetics, taxonomy, zoonoses, Algeria, Africa.

Sabry, MA. **Advanced concepts in diagnosis of hydatidosis in human and living animals.** *Journal of Biological Sciences.* 2007; 7(5): 720-728. ISSN: 1727-3048
Abstract: Fractionation of fertile Hydatid cyst fluid antigens (FHCFA) revealed 12 protein fractions at molecular weights (MW) of 105, 79, 62, 49, 38, 28, 24, 21, 18, 8 and 2 kD bands over 105 kD. The bands at MW of 38, 36, 29, 18, 16, 12 and 8 kD were reacted specifically with sera of rabbits with hydatidosis as well as sera of surgically proved HC infected patients using enzyme linked immuno-transfer blot (EITB) technique. Evaluating the diagnostic efficacy of 3 eluted concentrated subunits of these antigens at MW range of 32-38, 16-18 and 8-12 kD, revealed that the fractions in the range of 8-12 kD appear as the most specific (96.66%) fractions. It did not cross-react with antibodies (Ab) in the sera of patients infected with *Fasciola*, camels infected with gastro-intestinal nematodes and sheep infected with *Fasciola* and *Moniezia*. A clear mild level of cross reaction (10%) was observed in patients infected with hepatitis C virus and *Schistosoma mansonii*. These fractions appear more sensitive (100%) for the diagnosis of anti HC Ab in sera of surgically proved HC infected patients, HC infected camels and HC experimentally infected rabbits using ELISA technique. The last groups of bands (16-18 kD) appear as the least specific (81.66%) and sensitive (92.0%). The protein fractions in the range of 8-12 kD showed marked diagnostic

efficacy for hydatidosis infection in random samples of exposed people and pre-slaughtered animals. Diagnosis of infection by ELISA was closely related to diagnosis using sonographic examination in humans and postmortem examination in animals.
Descriptors: dromedary camels, humans, rabbits, *Echinococcus,* hydatid disease, hydatidosis, diagnosis, diagnostic techniques, echinococcosis, experimental infections, human diseases, zoonotic disease, immunoblotting, immunological techniques, serological techniques

2006

Ahmadi, N; Dalimi, A. **Characterization of *Echinococcus granulosus* isolates from human, sheep and camel in Iran.** *Infection, Genetics and Evolution.* 2006; 6(2): 85-90. ISSN: 1567-1348
DOI: http://dx.doi.org/10.1016/j.meegid.2005.01.005
Abstract: In the present study, *Echinococcus granulosus* isolates collected from human, sheep and camel samples in Iran were characterized based on rostellar hook morphology of protoscoleces as well as PCR-RFLP. Morphological study on human and animal isolates showed the presence of two distinct strains of the parasite, one in sheep and the other one in camels. In this regard, rostellar hook of sheep isolates were significantly different from those of camel origin, meanwhile human isolates were found to be similar to those isolated from sheep. Molecular analysis of the ITS1 region of rDNA derived from human, sheep and camel isolates were in agreement with the morphological findings. Based on the PCR-RFLP method, the sheep and human isolates appeared to pertain to the same genotype and the camel isolates were appeared to pertain to a different genotype. Reproduced with permission of CAB.
Descriptors: camels, sheep, human diseases,hydatid disease, echinococcosis, *Echinococcus granulosus,* genotypes, human diseases, zoonotic diseases, molecular biology, molecular epidemiology, morphology, protoscoleces, Iran.

Azlaf, Rkia; Dakkak, Allal. **Epidemiological study of the cystic echinococcosis in Morocco.** *Veterinary Parasitology.* 2006; 137(1-2): 83-93. ISSN: 0304-4017
URL: http://www.sciencedirect.com/science/journal/03044017
Abstract: The objectives of this epidemiological study on cystic echinococcosis (CE) in Morocco (2001-2004) were to update the prevalence of CE in different animal species living in the most important areas of the country and to collect protoscoleces and germinal layers for genetic research purposes. The post mortem inspection concerned 2948 sheep, 2337 goats, 618 cattle, 482 camels and 455 equines (325 horses, 60 mules and 70 donkeys) in five different regions: the Rif (Mediterranean coast and high mountains of the Rif), the Loukkos (Atlantic northwest plain), the center (Rabat and Casablanca regions), the Middle Atlas mountains and the south (arid and semi desert areas). The global CE infection prevalence rates obtained were 22.98% in cattle, 10.58% in sheep, 12.03% in camels, 17.80% in equines and 1.88% in goats. The infection rates were especially high in the Middle Atlas in cattle (48.72%) and in the Loukkos in cattle and sheep (37.61 and 31.65%, respectively).The majority of infected cattle (49.6%) and sheep (52.1%) had hydatid cysts in both liver and lungs. Except for cattle, the liver was more infected than lungs in all the other animal species. Animals more than 5 years old were the most infected in all species. The mean CE infection rates of these animals were about 56% in cattle, 40% in sheep, 20% in camels, 17.80% in

equines and 7% in goats. These rates were much higher in the Loukkos (85% of cattle and 59% of sheep) and in the Middle Atlas (68% of cattle and 45% of sheep) than in the other regions. Results showed that *Echinococcus granulosus* is in an endemic steady state with no evidence of protective immunity in the intermediate hosts. The mean numbers of infections per year are 0.099 for cattle, 0.063 for sheep, 0.03 for camels and 0.010 for goats. (C) 2006 Elsevier B.V. All rights reserved.
Descriptors: cattle, sheep, camels, goats, horses, mules, donkeys, postmortem inspections, echinococcosis prevalences, *Echinococcus granulosus*, Rif, Loukkos, Rabat and Casablanca regions, Middle Atlas mountains, arid and semi-desert areas of the southern areas, animals over 5 years most infected, prevalence varied by species and by region, Morocco.

Chhabra , MB; Gupta, SK. **Parasitic diseases of camels - an update. 2. Helminthoses.** *Journal of Camel Practice and Research.* 2006; 13(2): 81-87. ISSN: 0971-6777. Note: A literature review.
URL: http://www.camelsandcamelids.com
Abstract: Despite being usually reared under harsh environments unsuitable for propagation and transmission of helminths, camels are capable of harbouring a fairly large variety of these parasites. There is paucity of literature as helminthic infections of camels are generally regarded less of a problem than those in other ruminants. However, gastrointestinal nematodes (GIN) are known to undermine the overall health and productivity of camels. The camel stomach worm *Haemonchus longistipes* is the most pathogenic strongyle nematode of camels. A voracious blood sucker, it may be associated with clinical disease which can be fatal. Trichostrongyles are very common and may contribute to the debilitating effects of GIN. Extraintestinal nematodes commonly parasitizing camels include *Onchocerca fasciata*, which characteristically produces subcutaneous nodules in the head and neck regions; the filarial worm *Dipetalonema evansi*, the eye worm *Thelazia* spp. and rarely the lungworms (*Dictyocaulus* or *Protostrongylus* spp.). Among larval cestodes, hydatid cysts are commonly reported, while *Cysticercus* and *Coenurus* spp. are infrequent. This review combines information gleaned from recent reports on prevalence, epidemiology and clinical aspects of helminthoses of dromedary camels. The compilation also includes progress in anthelmintics relevant to the control of helminths in camels. It is intended to serve as guide for planning future investigations in this field. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel parasitic nematodes, helminthoses, helminthes, hydatids *Dictyocaulus*, *Dipetalonema evansi*, *Haemonchus longistipes*, *Onchocerca fasciata*, *Protostrongylus*, *Taenia*, *Thelazia*, *Trichostrongylus*, *Secernentea*, *Spirurida*, *Strongylida,* epidemiology, clinical aspects, diagnosis, disease control, disease prevalence, disease prevention, drug therapy; anthelmintics.

Dia, ML **Parasites of the camel in Burkina Faso.** *Tropical Animal Health and Production.* 2006; 38(1): 17-21. ISSN: 0049-4747
DOI: http://dx.doi.org/10.1007/s11250-006-4303-x
URL: http://www.springerlink.com/content/0049-4747
NAL call no : SF601.T7
Abstract: A survey was conducted to determine the prevalence of parasitoses in dromedaries in Burkina Faso. Blood and faecal samples from animals of different ages and both sexes were

collected from different villages in Oudalan in April 2004. It was shown that the parasitological and serological prevalences of *Trypanosoma evansi* were 18 and 46%, respectively. *T. brucei* was also detected. Most of the trypanosome-infected animals were from Garagara (37%), Markoye (30%) and Touro villages (11%), with seroprevalences of 81, 50 and 33%, respectively. None of the camels in Esakane had trypanosomes. 15 out of 38 faecal samples were positive for strongyle eggs, with higher rates in Markoye and Esakane. Eggs per g faeces (epg) varied from 0-800 and was highest in Markoye. One animal was positive for *Moniezia* spp. *Hyalomma dromedarii*, *H. marginatum rufipes*, *H. impressum*, *H. truncatum* and *H. impeltatum* were the most commonly isolated ticks in the camels. Alopecia and pruritus in many animals were caused by *Sarcoptes scabiei* var. *cameli*. Reproduced with permission of CAB.
Descriptors: dromedary camels, disease prevalence, disease surveys, epidemiological surveys, epidemiology, geographical variation, parasites, parasitoses, serological surveys, seroprevalence, *Trypanosoma evansi, Moniezia* spp. *Hyalomma dromedarii* , *Hyalomma marginatum rufipes*, *Hylomma impressum*, *Hyalomma truncatum*, *Hyalomma impeltatum,* mange, *Sarcoptes scabiei* var. *cameli*, Burkina Faso.

Haridy, FM; Ibrahim, BB; El Shazly, AM; Awad, SE; Sultan, DM; El Sherbini, GT; Morsy, TA.
Hydatidosis granulosus in Egyptian slaughtered animals in the years 2000-2005. *Journal of the Egyptian Society of Parasitology*. 2006; 36(3): 1087-1100. ISSN: 1110-0583
Abstract: This work aimed at the histopathologic and serologic identification of hydatidosis in slaughtered animals to clarify the zoonosis risk factors. The samples were collected from camels, sheep, goats, and pigs in Egyptian official abattoirs (from August 2000 to August 2005), and from cows and buffaloes at Mansoura official abattoirs (2005). 100 randomly chosen animals of each species were subjected to serologic and histopathologic examinations for infections. The overall five-year hydatidosis prevalence was 2.53%, 0.3% and 0.68% in camels, sheep and goats, and pigs respectively. The prevalence in cows and buffaloes was 6.4% in Mansoura (2005). There was a significant difference between animals regarding liver infection; the difference was highly significant for lung infection. A highly significant difference in hydatid cysts size was observed between pigs and other animal species ($p<0.000$) and a significant difference was observed between macroscopic findings in pigs and camels ($p=0.018$). A highly significant difference was observed histopathologically in all animal species except pigs and sheep and goats ($p=0.089$). IHAT showed highly significant difference between camels and other animal species ($p<0.000$). A significant histopathologic positive correlation was observed between positive IHAT and fertility (Pearson correlation=0.148, $p=0.003$).
Descriptors: camels, buffaloes, cattle, cows, goats, pigs, sheep, swine, post slaughter sampling, abattoirs, *Echinococcus granulosus*, disease prevalence; echinococcosis, hydatidosis cysts developmental stages, epidemiology, impact on fertility, histopathology, liver diseases, respiratory diseases, Egypt.

Hunter, A (Editor). ***La Sante Animale. Volume 2. Principales Maladies. [Animal Health. Volume 2. Principal Diseases.]*** Published by Editions Quae, Versailles. 2006; 310 pp. ISBN: 2759200051; 9782759200054. Note: In French.
Abstract: The first volume of this work considered the fundamentals of animal pathology and the principles of disease control; volume 2 considers the most important diseases of

livestock in the tropics and subtropics in more detail. Each disease is described with reference to its symptoms, aetiology, mode of transmission, treatment and prevention. The first part covers infectious and contagious diseases (viral and bacterial diseases, coccidiosis and dermatomycoses) of livestock in general, bovines, small ruminants, camels, equines and pigs. Part 2 covers venereal and congenital infections; part 3 describes arthropod parasites (flies, lice, fleas, ticks and mange mites). Vector-borne diseases of livestock in general, small ruminants and equines are considered in part 4, helminths and helminthoses in part 5, and environmental and other diseases (metabolic disorders, neoplasms, nutritional deficiency and poisoning) in part 6. This book is intended for use by veterinary technicians and agricultural advisors, and as a textbook in higher education. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, horses, pigs, sheep, pigs, livestock animal diseases, bacterial diseases, clinical aspects, coccidiosis, deficiency diseases, animal disease transmission, drug therapy, ectoparasites, helminthes, infectious diseases, metabolic disorders, poisoning, prophylaxis, tropics, vector borne diseases, viral diseases, bacterial infections, bacterioses, chemotherapy, clinical picture, communicable diseases, parasitic worms, toxicosis, tropical countries, viral infections.

Izadi, J; Ajami, A. **Biochemical profiles of hydatid cyst fluids of *Echinococcus granulosus* of human and animal origin (sheep, goat, cattle and camel).** *Journal of Animal and Veterinary Advances.* 2006; 5(7): 574-577. ISSN: 1680-5593
Abstract: A comparative study on the biochemical parameters in hydatid cyst fluids of sheep, goat, cattle, camel and human cystic forms of *Echinococcus granulosus* was made in Mazandaran. 112 samples of hydatid fluids were collected from the liver cysts of different hosts (16 sheep, 64 cattle, 12 goats, 10 camels and 10 humans) in slaughterhouses of Sari and Ghaemshahr and Immam hospital, respectively. All cyst fluids were centrifuged at 4500 rpm at 4 degrees C for 45 min, and the supernatants were analysed for various biochemical parameters. Quantitative variations in the levels of sodium, glucose, urea and alanine aminotransferase (AST) were found in the cystic fluids of different hosts, although these differences were insignificant. However, differences in the concentrations of potassium, calcium, triglycerides, cholesterol, uric acid, creatinine, albumin, gamma-glutamyltransferase, aspartate aminotransferase (AST) and creatine phosphokinase (CPK) in the different hydatid cyst fluids were significant. Differences in the biochemical composition of different hydatid cyst fluids suggested the existence of more than one strain of *E. granulosus* in human and other domestic animal intermediate hosts in Mazandaran. Reproduced with permission of CAB.
Descriptors: camels, cattle, goats, humans, sheep, *Echinococcus granulosus*, alanine aminotransferase, albumins, aspartate aminotransferase, cholesterol, creatine kinase, creatine phosphokinase, creatinine, gamma glutamyl transferase, glutamic pyruvic transaminase, glucose, hydatid cysts, intermediate hosts, lactate dehydrogenase, liver, calcium, potassium, sodium, triacylglycerols, urea, uric acid, Iran.

Kassem, Hamed H; Gdoura, Najyah K M. **Hydatidosis in camels (*Camelus dromedarius*) slaughtered at Sirt Abattoir, Libya** . *Journal of the Egyptian Society of Parasitology.* 2006; 36(2, Suppl. S): 1-10. ISSN: 1110-0583
Descriptors: 1380 dromedary camels, hydatid cysts in 3.62%, *Echinococcus granulosus*, males

3.07%, females 4.42% overall prevalence 3.62%, younger animals most infected, lungs and liver contained cysts, Libya.

Kassem, HH; Gdoura, NKM. **A biochemical study of cystic stage fluids of *Echinococcus granulosus* of animal origin in Libya.** *Journal of the Egyptian Society of Parasitology.* 2006; 36(3): 1017-1022

Abstract: The present study aimed to evaluate the biochemical composition of hydatid cyst fluids of infected sheep, goats and camels slaughtered in abattoir of Sirt, Libya. 20 samples of hydatid cyst fluids were collected from liver cysts of infected sheep, goats and camels. Calcium, iron, phosphorus, sodium, potassium, lipids, cholesterol, triglycerides, amylase and proteins were determined. The biochemical analyses of hydatid cyst fluids from sheep, goats and camels showed the same constituents of elements and organic compounds. But, sheep hydatid cyst fluids contained significantly more triglycerides ($P<0.05$), phosphorus ($P<0.05$) and protein ($P<0.001$) than those in camels and goats. Urea was significantly higher ($P<0.05$) in sheep and goats compared to camels. Reproduced with permission of CAB.

Descriptors: sheep, goats, camels, abattoirs, post slaughter tissue sampling, cystic echinococcosis, *Echinococcus granulosus*, hydatid cyst fluids, liver, amylases, calcium, cholesterol, iron, lipids, phosphorus, potassium, proteins, sodium, triacylglycerols, urea, Libya.

Magambo, J; Njoroge, E; Zeyhle, E. **Epidemiology and control of echinococcosis in sub-Saharan Africa.** *Parasitology International.* 2006; 55(Supplement): S193-S195. ISSN: 1383-5769. Note: A. Ito; PS Craig; PM Schantz (Editors). "Taeniasis/Cysticercosis and Echinococcosis with Focus on Asia and the Pacific. Proceedings of the 5th International Symposium on Cestode Zoonoses, Asahikawa, Japan, 2005."

Abstract: Cystic echinococcosis (CE) is highly endemic among the nomadic pastoral tribes of East Africa, but is rare amongst the agriculturally based communities. *Echinococcus granulosus* infections are common in dogs from all countries in sub-Saharan Africa where they have been examined. Transmission of *E. granulosus* to humans is affected by such factors as prevalence of the parasite in domestic dogs, behaviors of humans towards dogs, and heterogenicity of the parasite and susceptibility of humans to infection. Sheep and goats appear to be the most common domestic intermediate hosts, but recent studies suggest that camels are equally important intermediate host, especially in Sudan and Turkana. At least five of ten *E. granulosus* genotypes are infective to humans in sub-Saharan African. Most human cases of CE are caused by the sheep strain (GI) and camel strain (G6) of E. granulosus. Other strains occurring in the area may include a lion strain, the horse strain (G4 or *Echinococcus equinus*) and the cattle strain (G5 or *Echinococcus ortleppi*). Reproduced by permission of CAB.

Descriptors: camels, dogs, goats, sheep, humans, cystic echinococcosis, disease prevalence, disease transmission, epidemiology, human diseases, intermediate hosts, zoonoses, *Echinococcus granulosus*, *Echinococcus equinus*, *Echinococcus ortleppi*, zoonotic infections, Africa.

Mahfooz, A; Abubakar, M; Bilal, MQ; Ahmad, T. **Prevalence and chemotherapy of gastrointestinal parasites in camels in and around Faisalabad, Pakistan.** *Pakistan Veterinary Journal.* 2006; 26(4): 209-210. ISSN: 0253-8318

Abstract: The prevalence of gastrointestinal (GI) parasites and the efficacy of Dectomax (doramectin) against them were studied. 50 camels were selected from different localities of

Faisalabad. Faecal samples were collected and examined for the presence of parasites. The overall prevalence of GI parasites was 60%. The prevalences of *Haemonchus*, *Trichostrongylus*, *Strongyloides*, *Ostertagia*, *Moniezia expansa* and mixed infections were 20, 14, 8, 4, 4 and 10%, respectively. The efficacy of Dectomax was 75-90%, and it might be used for the treatment of GI parasites in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels,digestive tract; disease-prevalence, disease surveys, doramectin, drug therapy, mixed infections, *Haemonchus*, *Moniezia expansa*, *Ostertagia*, *Strongyloides*, *Trichostrongylus,* chemotherapy, disease surveillance, gastrointestinal tract, multiple infections, *Rhabditida*, *Secernentea*, *Strongylida,* Pakistan.

Mahran, OM. **Some epidemiological and parasitological studies on prevalence of gastrointestinal parasites of dromedary camels at Shalatin Region, Red Sea Governorate, Egypt and trials of treatment.** *Assiut Veterinary Medical Journal*. 2006; 52(111): 149-162. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: A parasitological survey of 530 camels of different ages and sex was carried out in January-December 2005 to investigate the prevalence of gastrointestinal parasites in the Shalatin region, Red Sea Governorate, Egypt. 72.83% of the examined camels were infected. Of the positive cases, 45.66% harboured helminth eggs, 10.94% coccidian oocysts and 16.22% had mixed infections. *Trichostrongylus* sp. was the most common nematode with a prevalence of 35.06%, followed by *Oesophagostomum* sp. (16.15%), *Trichuris* sp. (12.19%), *Haemonchus* sp. (10.67%), *Ostertagia* sp. (8.84%), *Chabertia* sp. (8.53%) and *Strongyloides* sp. (1.82%). Cestode (*Moniezia* sp.) eggs (1.82%) and coccidian oocysts (*Eimeria cameli*, 48.61%; *E. dromedarii*, 27.87%; *E. rajasthani*, 5.6%) were also present. Coproculture produced third stage larvae of *Trichostrongylus*., *Strongyloides*, *Haemonchus* and *Ostertagia* spp. The prevalence of infection was lower in young and higher in older animals. Females were more highly infected than males. The highest rates of infection were observed in winter and spring. Therapeutical trials with different anthelmintic drugs showed that albendazole was the drug of choice for the treatment of camel helminthoses. Reproduced with permission of CAB.
Descriptors: dromedary camels, various ages, females, males, intestinal parasitic nematodes, detection, diagnosis, disease prevalence, disease surveys, epidemiology, helminthoses, mixed infections, nematode control, parasitology, spring, winter, disease surveillance, *Chabertia*, *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Trichuris*, *Eimeria cameli*, *Moniezia*, Adenophorea, *Enoplida*, gastrointestinal tract, multiple infections, *Secernentea*, *Strongylida*, *Eimeria dromedarii*, *Eimeria rajasthani*, albendazole, Egypt.

Moghaddar, N; Zahedie, A. **Prevalence and pathogenesis of *Onchocerca fasciata* infection in camels (*Camelus dromedarius*) in Iran.** *Journal of Camel Practice and Research.* 2006; 13(1): 31-35. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to determine the prevalence and pathogenic effect of *Onchocerca fasciata* during tissue invasion phase in camels from Iran. 50 dromedary camels of either sex and different age groups were examined immediately after slaughter for the presence of *O. fasciata* over a period of 1.5 years. 24 camels (48%) carried the nodules of *O. fasciata*. Older animals showed a higher infection rate as well as the males. The nodules were mostly found on the sides of neck, followed by sides of the abdomen and thorax and rarely

in the back region. A single nodule or nodules in groups of 2-4 which contained the worms were usually observed. Sections of the nodules showed filarial worms (*O. fasciata*) surrounded by a fibrous connective tissue capsule. The nodules had a number of cavities containing sections and fragments of worms in different planes. The inflammatory cells infiltrated in the area comprised of lymphocytes, eosinophils and histiocytes. A more intense fibrous connective tissue with excessive granulomatous reaction surrounded by a zone of lymphocytes and giant cells was observed in the older lesions. Microfilariae were observed in the subcutaneous tissue near the lesions, mostly parallel to the location of nodules containing adult parasites. The nodules were often mistaken as tuberculous infection of lymph nodes. The infected animals mostly had a low sale price, and their carcasses are even condemned. Reproduced with permission of CAB.

Descriptors: dromedary camels, age differences, *Onchocerca fasciata*, connective tissue, disease prevalence, disease surveys, eosinophils, epidemiology, histiocytes, histopathology, infectivity, lymphocytes, microfilariae, onchocerciasis, pathogenesis, sex differences, disease-surveillance, eosinophil, leukocytes, river blindness, *Secernentea*, *Spirurida*, Iran.

Radfar, MH; Maimand, AE; Sharify, A. **A report on parasitic infections in camel (*Camelus dromedarius*) of Kerman slaughterhouse.** *Journal of the Faculty of Veterinary Medicine, University of Tehran.* 2006; 61(2): 165-168. ISSN: 1022-646X. Note: In Persian with an English summary.

Abstract: This study was conducted to determine the prevalence of parasitic infections in camels (*Camelus dromedarius;* n=60) from the Kerman slaughterhouse. The examination of different organs (including alimentary canal, abdominal cavity, liver, lung, kidneys, and heart) and blood smear for parasitic infections were done. The parasites in the washed contents of alimentary canal, lung and sliced organ were cleared using lactophenol or stained with carmine acid collected, counted and identified under the microscope. Blood smears were stained with Giemsa stain. Parasites were found on the alimentary tract, liver, lung, nasal cavity and blood of the camels. Eight species of parasites were detected in abomasum (*Haemonchus contortus*; 6.67%), small intestine (*Moniezia expansa,* 5%; *M. benedeni,* 6.67%; *Stilesia globipunctata*, 8.3%), liver (hydatid cyst, 3.3%), lungs (hydatid cyst, 28%; *Dictyocaulus filaria*, 10%), nasal cavity (*Cephalopina titillator* larvae, 63.3%), and blood (*Trypanosoma evansi*, 1.6%). This is the first report of these parasites in camels from Kerman. Reproduced with permission of CAB.

Descriptors: dromedary camels, post slaughter sampling, diseases, abdominal cavity, disease prevalence, epidemiology, hydatids, heart, kidneys, liver, lungs, small intestine, gastrointestinal tract, nasal cavity, *Cephalopina titillator*, *Dictyocaulus filarial*, *Haemonchus contortus*, *Moniezia benedeni*, *Moniezia expansa,Stilesia globipunctata*, *Trypanosoma evansi*, *Secernentea*, *Strongylida*, Kerman.

Oudni M'Rad, M; Cabaret, J; M'Rad, S; Bouzid, W; Mekki, M; Belguith, M; Sayadi, T; Nouri, A; Lahmar, S; Azaiez, R; Mezhoud, H; Babba, H. **Genetic differences between Tunisian camel and sheep strains of the cestode *Echinococcus granulosus* revealed by SSCP.** *Parasite*. 2006; 13(2): 131-136. ISSN: 1252-607X. Note: In English with a French summary.

NAL call no: QL57 P3737

Abstract: Ovine and dromedary isolates from Tunisia were identified as G1 and G6 strains

based on polymorphism of the mitochondrial cytochrome C oxydase CO1. Single strand conformation polymorphism was used in order to examine the genetic variation within and between Tunisian G1 and G6 strains and to estimate the extent of selfing. The dromedary isolates are genetically distinct from sheep isolates (high value of genetic variation between populations: Fst=0.46). No significant deficiency in heterozygotes was found in sheep isolates, whereas heterozygote deficiency (suggesting selfing) was found in a limited number of camel isolates. Reproduced with permission of CAB.
Descriptors: dromedary camels, sheep, *Echinococcus granulosus* isolates, pathogen strains, cytochrome C oxidase, echinococcosis, hydatid disease, genetic analysis, genetic polymorphism, genetic variation, heterozygotes, mitochondria, Tunisia.

Rkia Azlaf; Allal Dakkak. **Epidemiological study of the cystic echinococcosis in Morocco.** *Veterinary Parasitology*. 2006; 137(1/2): 83-93, ISSN: 0304-4017
URL: http://www.sciencedirect.com/science/journal/03044017
Abstract: The objectives of this epidemiological study on cystic echinococcosis (CE) in Morocco (2001-2004) were to update the prevalence of CE in different animal species living in the most important areas of the country and to collect protoscoleces and germinal layers for genetic research purposes. The post mortem inspection concerned 2948 sheep, 2337 goats, 618 cattle, 482 camels and 455 equines (325 horses, 60 mules and 70 donkeys) in five different regions: the Rif (Mediterranean coast and high mountains of the Rif), the Loukkos (Atlantic northwest plain), the centre (Rabat and Casablanca regions), the Middle Atlas mountains and the south (arid and semi desert areas). The global CE infection prevalence rates obtained were 22.98% in cattle, 10.58% in sheep, 12.03% in camels, 17.80% in equines and 1.88% in goats. The infection rates were especially high in the Middle Atlas in cattle (48.72%) and in the Loukkos in cattle and sheep (37.61 and 31.65%, respectively). The majority of infected cattle (49.6%) and sheep (52.1%) had hydatid cysts in both liver and lungs. Except for cattle, the liver was more infected than lungs in all the other animal species. Animals more than 5 years old were the most infected in all species. The mean CE infection rates of these animals were about 56% in cattle, 40% in sheep, 20% in camels, 17.80% in equines and 7% in goats. These rates were much higher in the Loukkos (85% of cattle and 59% of sheep) and in the Middle Atlas (68% of cattle and 45% of sheep) than in the other regions. Results showed that Echinococcus granulosus is in an endemic steady state with no evidence of protective immunity in the intermediate hosts. The mean numbers of infections per year are 0.099 for cattle, 0.063 for sheep, 0.03 for camels and 0.010 for goats.
Descriptors: camels, asses, donkeys, cattle, horses, goats, sheep, mules, hydatid disease, hydatidosis, cystic echinococcosis, disease prevalence, disease surveys, echinococcosis, liver and lunds affected, epidemiology, protoscoleces, *Echinococcus granulosus,* Morocco, Africa.

Sadjjadi, Seyed Mahmoud. **Present situation of echinococcosis in the Middle East and Arabic North Africa.** *Parasitology International.* 2006; 55(Suppl. S): S197-S202. ISSN: 1383-5769.
Note: A. Ito; PS Craig; PM Schantz. (Editors) "Taeniasis/Cysticercosis and Echinococcosis with Focus on Asia and the Pacific. Proceedings of the 5th International Symposium on Cestode Zoonoses, Asahikawa, Japan, 2005."
URL: http://www.elsevier.com/wps/find/journaldescription.cws_home/353/description#description

Abstract: Echinococcosis is one of the major zoonotic parasitic diseases in the Middle East and Arabic North Africa from Morocco to Egypt. Both cystic and alveolar echinococcosis has been reported from these areas. However, cystic echinococcosis is more prevalent and has been reported from all countries in the Middle East and Arabic North Africa. Alveolar echinococcosis is less prevalent and has been reported only from Iran, Turkey, Iraq and Tunisia. Present situation of echinococcosis in dogs and other definitive hosts, animal intermediate hosts and humans in the Middle East and Arabic North Africa has been reviewed. *Echinococcus granulosus* is highly prevalent in Iran, Turkey, Iraq, Morocco, Tunisia, and Libya. In the Levant countries, the cystic echinococcosis is also highly endemic. In Oman, it is endemic with low prevalence and a very low level in Cyprus. Various surveys have indicated that hydatid cysts are commonly found in sheep, cattle, goats and camels throughout the Middle East and Arabic North Africa. Sheep are the most infected animals of these regions. Most of studies on human have been focused on surgical reports although several population studies have been performed using serological and imaging techniques. Human cystic echinococcosis (CE) is prevalent in the Middle East and Arabic North Africa. It is hyper endemic in Iran, Turkey, Iraq, Jordan, Morocco, Libya, Tunisia, and Algeria, and endemic in Egypt. Studies on the strain specificities of *E. granulosus* in the Middle East revealed sheep strain (G1) present in sheep, goats, cattle, camels and humans, and the camel strain (G6) in camels, sheep, cattle as wel as humans. Dog/sheep strain seems to be more prevalent in the foregoing regions in documented reports from Iran and Jordan. However, a strain of *E. granulosus*, which resembles the horse strain (G4) strain, has been reported from Jordan. Strain specifications of *E. granulosus* in Arabic North Africa showed that sheep/dog strain (G I) have been reported from Tunisia and Libya both from humans and animals. However, in Egypt the human cases reported are of camel/dog strain.
Descriptors: cattle, sheep, camels, dogs, goats, horses, humans, *Echinococcus granulosus,Echinococcus multilocularis*, definitive hosts, animal intermediate hosts, serological testing, clinical techniques, diagnostic techniques, zoonotic parasitic disease, Morocco, Libya, Turkey, Cyprus, Iraq, Iran, Tunisia, Algeria.

Saeed, A; Hussain, MM; Gopal Chand; Al Yousuf, RJ. **Gastrointestinal parasites of camels in United Arab Emirates.** *Indian Journal of Animal Sciences.* 2006; 76(8): 612-613. ISSN: 0367-8318

Abstract: This study was conducted to determine the presence of gastrointestinal parasites in camels of different age and sex in United Arab Emirates. The observation of the prevalence of gastrointestinal parasites in 831 camels was conducted between September 2002 and April 2004. Out of the 831 camels examined, 119 were positive for parasitic infections. It was observed that younger animals were significantly more prone to infection than the adults. Out of 294 males and 537 females examined, 37 (12.58%) and 82 (15.27%) camels were positive for gastrointestinal parasites, respectively. The following parasites were observed: *Haemonchus*, *Nematodirus,Trichostrongylus*, *Trichuris*, *Oesophagostomum*, *Camelostrongylus*, *Moniezia*, *Paramphistomum*, *Eimeria* and *Balantidium* sp.

Descriptors: dromedary camels, parasitic diseases, gastrointestinal tract parasitoses, age differences, sex differences, *Haemonchus*, *Nematodirus,Trichostrongylus*, *Trichuris*, *Oesopha-*

gostomum, *Camelostrongylus*, *Moniezia*, *Paramphistomum*, *Eimeria* and *Balantidium*, disease prevalence, epidemiology, United Arab Emirates.

Sharma, DK; Chauhan, PPS. **Coenurosis status in Afro-Asian region: A review.** *Small Ruminant Research.* 2006 Aug; 64(3): 197-202. ISSN: 0921-4488
URL: http://www.elsevier.com/wps/find/journaldescription.cws_home/503317/description#description
DOI: http://dx.doi.org/10.1016/j.smallrumres.2005.05.021
NAL call no: SF380.I52
Abstract: *Coenurus cerebralis* infection has been observed as a common and worldwide problem of small ruminants. Dog being definitive host of *Taenia multiceps* plays an important role in spreading the disease. Occurrence of coenurosis cysts in brain, spinal cord and in other tissues have been noticed in wide range of animals like sheep, goats, cattle, horse, buffalo, camel and yak including some wild animals. Prevalence of *Coenurus* cysts ranged from 1.3 to 9.8% in some herds leading to mortality (1.14-24.61%) and culling of animals to the extent of 37.4%. The cysts showed much variation in respect of their locations and size. Occurrence of coenurosis was observed to be age related, however, early age seemed to be refractory as 90% cases were reported in adult sheep and goats. Clinical syndrome presented vivid types of nervous symptoms with little or no change in haematological and biochemical profile. Treatment of coenurosis in sheep and goats ranged from chemotherapy using albendazole, niclosamide and praziquintal showing little or no effect, to successful surgical removal.
Descriptors: sheep, sheep diseases, goats, goat diseases, central nervous system diseases, cestode infections, *Taenia multiceps*, *Coenurus cerebralis,* literature reviews, epidemiology, disease prevalence, economic impact, life cycle, cysts (developmental-stages), encystment, disease detection, chemotherapy, Africa, Asia.

2005

Abd El Wahed, Mohammad M. **Incidence of *Nematodirus* species and their differentiation through the infective third stage larvae among Egyptian camels.** *Journal of the Egyptian Society of Parasitology.* 2005; 35(2): 447. ISSN: 1110-0583
Descriptors: 312 dromedary camels, parasitic infection, incidence testing for *Nematodirus* eggs, fecal sampling, *Nematodirus battus*, *Nematodirus filicollis*, *Nematodiru spathiger*, different regions of the country tested, Egypt.

Ahmadi, NA. **Hydatidosis in camels (*Camelus dromedarius*) and their potential role in the epidemiology of Echinococcus granulosus in Iran.** *Journal of Helminthology*. 2005 June; 79(2): 119-125. ISSN: 0022-149X
URL: http://www.ingenta.com/journals/browse/cabi/joh
DOI: http://dx.doi.org/10.1079/JOH2005279
Abstract : Hydatid cysts were recovered from 35.2% (233/661) of camels (*Camelus dromedarius*) slaughtered in five different regions of Iran. The degree of prevalence between males (34.4%) and females (36.6%) was not statistically significant. The highest rate of infection (59.3%) was found in the Isfahan region (in the central part of Iran) while the lowest

(25.7%) was found in Kerman province. The organ distribution of cysts was 49.4% in lungs alone, 30.0% in both liver and lungs, 14.6% in liver only and 6.0% in other organs. Therefore, the lungs were the predominant sites of the hydatid cyst. The range in the number of cysts was 1-48 in infected animals. The majority of the camels had 1-5 cysts, with 21.9%, 11.6% and 5.6% of infected camels having 6-10, 11-20 and 21 or more cysts respectively. There was a direct relationship between the rate and intensity of infection and host age. The fertility rate of lung cysts (69.7%) was higher than that of liver cysts (58.7%) and other organs (50.0%) whilst the viability rate of protoscoleces of liver fertile cysts (80.3%) was significantly higher than that of lung cysts (55.8%) and other organs (57.1%). The role of camels in the epidemiology of Echinococcus granulosus in Iran is discussed. Reproduced with permission of CAB.
Descriptors: dromedaries, echinococcosis, *Echinococcus granulosus*, disease prevalence, geographical variation, hydatids, tissue distribution, lungs, liver, protoscoleces, disease severity, animal age, epidemiological surveys, host age, host sex, Iran.

Dyab, KA; Hassanein, R; Hussein, AAA; Metwally, SE; Gaad, HM. **Hydatidosis among man and animals in Assiut and Aswan governorates.** *Journal of the Egyptian Society of Parasitology.* 2005; 35(1): 157-166. ISSN: 1110-0583
Abstract: 100 serum samples from suspected cases of acute and chronic hepatic diseases at Assiut University Hospital, Assiut, (n=50 cases) and in private clinics in Aswan, Egypt (n=50 cases) were tested for the presence of antibodies against hydatidosis. Between May 2003 and April 2004, 688 animals (398 camels, 186 cattle and 104 buffaloes) at Beni-Adi and Assiut abattoirs and 1257 animals (997 camels, 163 cattle, 97 buffaloes) at Darao abattoir in Aswan were examined for hydatid cyst. Hydatid cysts were detected in camels in Assiut (12.06%) and Aswan (5.91%). Overall infection rate in camels was 7.67% (107 of 1395). Most of the infected camels in Assiut and Aswan had cysts in the lungs (100% and 61.01%, respectively). Other camels in Aswan had cysts in the lungs and liver (23.72%) or lungs and spleen (15.25%). None was recorded from cattle and buffaloes. Fertile and sterile hydatid cysts in Assiut (60.41% and 39.58%, respectively) and Aswan (54.23% and 45.76%, respectively) were found. The prevalence of hydatid cysts in Assiut and Aswan in summer, autumn, winter and spring were as follows: 15.78% and 6.34%; 12.0% and 7.83%; 10.58% and 3.03%; and 10.52% and 5.18% (P<0.01). Three patients (6.0%) in Assiut and two (4.0%) in Aswan were seropositive. These patients suffered hepatomegaly, pain, fever and jaundice.
Descrptors: dromedary camels, humans, *Echinococcus granulosus*, abattoirs, post slaughter sampling, cysts developmental stages, disease prevalence, echinococcosis, hydatid disease, epidemiology, seroprevalence, liver, lungs, spleen, spring, summer, winter, autumn, Egypt.

El Wahed, MMA. **Incidence of *Nematodirus* species and their differentiation through the infective third stage larvae among Egyptian camels.** *Journal of the Egyptian Society of Parasitology.* 2005; 35(2): 447-450. ISSN: 1110-0583
Descriptors: dromedary camels, fecal sampling, incidence levels of *Nematodirus* ova, *Nematodirus. battus*, *Nematodirus filicollis*, *Nematodirus spathiger*, images of isolates, measurements table, Egypt.

Kadja, MC; Biaou, FC; Kane, Y; Kaboret, Y; Pangui, LJ; Abiola, FA. **Efficacite d'une formulation d'anthelminthique injectable a base d'albendazole sulfoxyde sur les nematodes gastro-intestinaux du dromadaire (*Camelus dromedarius*) au Senegal.[Efficacy of an injectable anthelmintic albendazole sulfoxide formulation on gastro-intestinal nematodes of the dromedary (*Camelus dromedarius*) in Senegal.]** *Revue de Medecine Veterinaire*. 2005; 156(6): 332-335. ISSN: 0035-1555. Note: In French with an English summary.

Abstract: In Sub-Saharan Africa, few studies are dedicated to the treatments of diseases in dromedaries. This work was undertaken in order to improve the therapeutic schemes in this species, which appears as a more and more important species. The efficacy of an injectable albendazole sulfoxide formulation was compared with an albendazole bolus on dromedary gastro-intestinal nematodes in Senegal. Parasitologic study by quantitative coproscopy showed that, the injectable formulation of albendazole sulfoxide is effective on the gastro-intestinal nematodes of dromedary. Its efficacy was variable (74 to 100%) according to the methods of calculation used. Thus, injectable albendazole sulfoxide is recommended for the treatment of gastrointestinal nematodes infections in the dromedary. Reproduced with permission of CAB.

Descriptors: dromedary camels, gastrointestinal nematode parasites, albendazole sulfoxide as treatment, injected formulation, drug efficacy, animal parasitic nematodes, helminthes, Senegal.

Kandil, OM; Mahmoud, MS; El Moghazy, FM. **Comparative characterization and DNA analysis of hydatid and *Cysticercus taenuicollis* cyst fluids.** *Veterinary Medical Journal Giza.* 2005; 53(1): 127-142. ISSN: 1110-1423

Abstract: Molecular technology is providing highly improved methods for identification of parasites, either of medical, veterinary, biological importance or interest. Hydatid fluid of sheep (HFS), camel (HFC), donkey (HFE) and pig (HFP) origin and *Cysticercus taenuicollis* [*Taenia taenuicollis*] fluid of sheep (CTFS) and pig (CTFP) origin collected from Egypt [date not given] were used in this investigation. Electrophoretic profile of metacestode fluid antigens using SDS-PAGE revealed multiple components in both high and low molecular weight ranges. There was extensive electrophoretic similarity between the investigated fluid antigens especially at 83 KDa and a common band for all antigens except CTFP at 243 KDa. Extensive cross-reactivity between metacestode fluid antigens in EITB using hyperimmune serum of hydatid cyst fluid of camel origin. There was common polypeptide band at 83 KDa recognized among all species. Cross-reactive components between all antigens except CTFS recognized by antiserum of HFC at 116 KDa and also between all antigens except HFS at 95 KDa. Further investigations will be necessary to isolate the cross-reactive antigens and to evaluate their potency in protection against heterologous infection. The amplified restriction fragment length polymorphism (AFLP) technique is a relatively new method for the analysis of polymorphism that has not yet been widely used in parasitology. In this article, DNA analysis gave similar fragment for HFS, HFE, HFC, HFP, CTFS and CTFP at 293 Kpb and a common fragment at 305 Kpb in C. taenuicollis and hydatid fluids expect those from camel origin. These findings may have important consequences for human health and the control of hydatid and cysticercosis diseases.

Descriptors: camels, donkeys, asses, pigs, sheep, *Taenia taenuicollis*, taeniosis, amplified fragment length polymorphism, RFLP, antigenic variation, antigens, cross reaction, cysticercosis,

cysts developmental, stages, diagnosis, diagnostic techniques, epidemiological surveys, epidemiology, genetic analysis, genetic polymorphism, hydatids, immune serum, metacestodes, SDS-PAGE, Egypt.

M'rad, S; Filisetti, D; Oudni, M; Mekki, M; Belguith, M; Nouri, A; Sayadi, T; Lahmar, S; Candolfi, E; Azaiez, R; Mezhoud, H; Babba, H. **Molecular evidence of ovine (G1) and camel (G6) strains of *Echinococcus granulosus* in Tunisia and putative role of cattle in human contamination.** *Veterinary Parasitology.* 2005; 129(3/4): 267-272. ISSN: 0304-4017
URL: http://www.sciencedirect.com/science/journal/03044017
Abstracts: Three hundred and seventy-two cysts coming from 50 humans, 166 cattle, 153 sheep and 3 camels were collected in order to establish some epidemiological molecular information in Tunisia for the first time. The analysis by PCR-RFLP of ITS1 sequence showed that all the human, ovine and bovine cysts were due to the common sheep strain of Echinococcus granulosus. The sequencing of the CO1 gene of 37 isolates confirm the G1 genotype of this strain. For seven of these isolates, we found the mutation C56T which is present in the three principal intermediate hosts: human (three cysts), cattle (three cysts) and sheep (one cyst). With regard to the G1 genotype, we identified three other point mutations. The camel strain G6 is uniquely found in the three camels isolates and not in the other intermediate hosts analysed. The fertility of the bovine cyst represents 48% that means that this host is involved in a bovine-dog cycle and consequently represents a reservoir of sheep strain in Tunisia. Our results confirm the importance of the prophylaxis measures in order to disrupt the cycle of transmission sheep-dog in Tunisia. Nevertheless, the supervision of bovine infection should be reinforced because this intermediate host may constitute an important link with the human contamination. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, sheep, dogs, humans, *Echinococcus granulosus*, hydatid disease, echinococcosis, cestode infections, contamination, cysts developmental stages, PCR, pathogen genes, pathogen genotypes, pathogen mutations, internal transcribed spacer, zoonotic diseases, intermediate hosts, reservoir hosts, Tunisia.

Mazen , NAM . **Light and scanning electron microscopy observations of adult *Haemonchus placei* (Nematoda: Trichostrongyloidea) of camels in Assiut, Egypt.** *Assiut Veterinary Medical Journal.* 2005; 51(105): 254-264. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: The aim of the present study was to provide additional information on morphology of the adult male and female *Haemonchus placei* in camels by using light and scanning electron microscopes. Adult worms were recovered from the stomach or abomasum of camels. The study revealed the presence of a small buccal cavity with a dorsal lancet, 6 internal labial papillae, 6 external labial papillae, 4 somatic papillae and two lateral amphidal pits of the *H. placei*. The cervical papillae were prominent and spine-like (370 micro m). The excretory pore was present and measured 315 micro m in diameter. The male bursa had elongated lobes supported by long, slender rays. The small dorsal lobe was asymmetrical with Y-shaped dorsal rays. The spicules were long, each provided with a small barb and pore near its extremity. The vulva of the female had a linguiform process or flap, and the anal pore at the posterior end of the body had a simple dorsal rim and a muscular ventral rim. Reproduced with permission of CAB.

Descriptors: dromedary camels, nematode infections, *Haemonchus placei,* microscopy, parasite morphology, males and females, various body parts describes, Egypt.

Omer, OH; Al Sagair, O. **The occurrence of *Thysanosoma actinioides* Diesing, 1834 (Cestoda: Anoplocephalidae) in a Najdi Camel in Saudi Arabia.** *Veterinary Parasitology.* 2005; 131(1/2): 165-167. ISSN: 0304-4017
URL: http://www.sciencedirect.com/science/journal/03044017
Descriptors: Najdi dromedary camels, case report, post slaughter liver sampling, fringed tapeworm, *Thysanosoma actinioides*, new host record, cestode infection, tapeworms, liver, bile ducts, clinical aspects, central Saudi Arabia.

Sopyev, B; Divanov, B; Charyev, C. **Diseases of camels, their preventive maintenance and treatment.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 60-66. ISBN: 1586034731
Descriptors: dromedary camels, Bactrian camels, acaricides, brucellosis, clinical aspects, diagnosis, diminazene, disease prevalence, disease prevention, drug therapy, azidine, berenil, hydatid disease, hydatidosis, echinococcosis, epidemiology, helminthoses, licorice, mange, plague, smallpox, trypanosomiasis, vaccination, *Brucella*, *Cephalopina*, *Echinococcus*, *Glycyrrhiza*, *Sarcoptes scabiei*, *Taenia hydatigena*, *Trypanosoma*, *Yersinia pestis*, Turkmenistan. Central Asia.

Tanwar, RK; Anju Chahar; Fakhruddin. **Prevalence of gastro-intestinal nematodes infestation in camels (*Camelus dromedarius*) in and around Bikaner, Rajasthan.** *Veterinary Practitioner.* 2005; 6(2): 133-134. ISSN: 0972-4036
Abstract: 208 faecal samples were collected from 6- to 12-year-old dromedaries of both sexes in Rajasthan, India, in 2003 and screened for the presence of helminth eggs. The prevalence of gastrointestinal nematodes was 35.57%. *Trichuris*, *Strongylus* and *Strongyloides* spp. eggs were present in the positive samples, while trematode and cestode eggs were absent. The average number of eggs per g of faeces was 600-1500. Strongyle infection was highest in July-September. Infected animals had reduced appetites and were in poor condition. They were orally treated with fenbendazole at 5 mg/kg body weight.
Descriptors: dromedary camels, varying ages, animal parasitic nematodes, *Trichuris*, *Strongylus*, *Strongyloides,* disease prevalence, disease surveys, epidemiological surveys, epidemiology, fecal sampling, helminth ova, mixed nematode infections, seasonal variation, seasonality, clinical picture, treatment with fenbendazole, Rajasthan, India.

2004

Azab, ME; Bishara, SA; Helmy, H; Oteifa, NM; El Hoseiny, LM; Ramzy, RMR; Ahmed, MA. **Molecular characterization of Egyptian human and animal *Echinococcus granulosus* isolates by RAPD-PCR technique.** *Journal of the Egyptian Society of Parasitology*. 2004; 34(1): 83-96. ISSN: 1110-0583
Abstract: Five primers of known, but arbitrary nucleotide sequence (OPH-03, OPH-05, OPH-12, OPH-15, OPH-18) were used to detect genetic variability in Egyptian human,

camel and pig E. granulosus isolates. OPH-03, OPH-05 and OPH-15 proved useful as genetic markers of strain variation, while OPH-12 and OPH-18 allowed distinction at the genus level i.e. diversified from *Cysticercus tenuicollis*. OPH-03 was the most effective giving sharp distinct banding pattern and the least values of similarity coefficients. Some variations were detected within *E. granulosus* isolates from the same host. The level of heterogeneity was low in three of the human isolates, camel and pig strains. Individual variation was detectable within other 3 human isolates. Human and camel isolates were the most related pair, having similar patterns and the highest similarity coefficients. The study implies that human cases in Egypt are of the camel/dog strain, and camels are important hosts for the transmission of human hydatidosis. Reproduced with permission of CAB.
Descriptors: dromedary camels, humans, pigs, *Echinococcus granulosus*, strains, echinococcosis, hydatid disease, genetic markers, genetic variation, heterogeneity, human diseases, molecular genetics, nucleotide sequences, PCR, Egypt.

Dinkel, A; Njoroge, EM; Zimmermann, A; Walz, M; Zeyhle, E; Elmahdi, IE; Mackenstedt, U; Romig, T. **A PCR system for detection of species and genotypes of the *Echinococcus granulosus*-complex, with reference to the epidemiological situation in eastern Africa.** *International Journal for Parasitology.* 2004; 34(5): 645-653. ISSN: 0020-7519
DOI: http://dx.doi.org/10.1016/j.ijpara.2003.12.013
Abstract: We describe the development of a specific and sensitive PCR/semi-nested PCR system for the rapid diagnosis of *Echinococcus granulosus* genotype G1, *E. granulosus* genotype G6/7, and *Echinococcus ortleppi* (G5). Diagnosis of G1 and the group G5/6/7 is performed by a simple PCR, while discrimination between *E. ortleppi* (G5) and G6/7 involves a subsequent semi-nested PCR step. The target sequence for amplification is part of the mitochondrial 12S rRNA gene. Specificity of the PCRs was 100% when evaluated with isolates of 16 species of cestodes, including *Echinococcus multilocularis*, *Echinococcus equinus*, *E. ortleppi* and three strains of *E. granulosus* (G1, G6 and G7). Sensitivity threshold was 0.25 pg of DNA. This new approach was compared with published protocols of restriction fragment length polymorphism-PCR and sequencing of mitochondrial cytochrome c oxidase subunit 1 and NADH dehydrogenase 1 genes using *Echinococcus* isolates of human, sheep, goat, camel, cattle and pig origin from Kenya and Sudan. Additionally, two internal DNA probes were developed, one hybridising only with G1, the other with G5, G6 and G7 amplification products. Preliminary epidemiological results obtained with this PCR approach include the detection of a camel strain (G6) infection for the first time in a human patient from eastern Africa, and the first reports of *E. ortleppi* (G5) in livestock from Kenya and the Sudan. Reproduced with permision of CAB.
Descriptors: dromedary camels, cattle, goats, sheep, pigs, humans, zoonotic diseases, parasite detection, genotypes, *Echinococcus granulosus,Echinococcus multilocularis*, *Echinococcus equinus*, *Echinococcus ortleppi*, diagnosis, diagnostic techniques, PCR, epidemiology, genotypes, zoonotic diseases, mitochondria, polymerase chain reaction, strains, Africa, Kenya, Sudan.

Lahmar, S; Debbek, H; Zhang, LH; McManus, DP; Souissi, A; Chelly, S; Torgerson, PR. **Transmission dynamics of the *Echinococcus granulosus* sheep-dog strain (G1 genotype) in camels in Tunisia.** *Veterinary Parasitology*. 2004; 121(1/2): 151-156. ISSN: 0304-4017

DOI :http://dx.doi.org/10.1016/j.vetpar.2004.02.016
Abstract: Cystic echinococcosis, caused by *Echinococcus granulosus,* is highly endemic in North Africa and the Middle East. This paper examines the abundance and prevalence of infection of *E. granulosus* in camels in Tunisia. No cysts were found in 103 camels from Kebili, whilst 19 of 188 camels from Benguerden (10.1%) were infected. Of the cysts found 95% were considered fertile with the presence of protoscolices and 80% of protoscolices were considered viable by their ability to exclude aqueous eosin. Molecular techniques were used on cyst material from camels and this demonstrated that the study animals were infected with the G1 sheep strain of *E. granulosus.* Observed data were fitted to a mathematical model by maximum likelihood techniques to define the parameters and their confidence limits and the negative binomial distribution was used to define the error variance in the observed data. The infection pressure to camels was somewhat lower in comparison to sheep reported in an earlier study. However, because camels are much longer-lived animals, the results of the model fit suggested that older camels have a relatively high prevalence rate, reaching a most likely value of 32% at age 15 years. This could represent an important source of transmission to dogs and hence indirectly to man of this zonotic strain. In common with similar studies on other species, there was no evidence of parasite-induced immunity in camels.
Descriptors: dromedary camels, sheep, dogs, *Echinococcus granulosus,* cystic echinococcosis, cysts developmental stages, disease prevalence, disease transmission, epidemiology, mathematical models, zoonoses, Tunisia.

Mazen, Nawal AM. **Scanning electron microscopy of the whipworm *Trichuris globulosa* (Linstow, 1901) (Nematoda: Trichocephalida) infecting the camel *Camelus dromedarius* in Libya.** *Journal of the Egyptian German Society of Zoology.* 2004 July; 45(D): 163-175. Note: In English with an Arabic and English summary.
Descriptors: dromedary camels, *Trichuris globulosa*, whipworm infection, gross morphology, light and scanning electron microscopy, cloacal morphology of the parasite, superficial armament of the spicular sheath, description of the male cylindrical spicular sheath and covering spines, spine structure and shape, female worms vulva's spines, egg is a chitinous shell of dense lamellae, surface has pits of various sizes and shape, Libya.

Nijiru, ZK; Constantine, CC; Ndung' u, JM; Robertson, I; Okaye, S; Thompson, RCA; Reid, SA. **Detection of *Trypanosoma evansi* in camels using PCR and CATT.** *Veterinary Parasitology*. 2004 Oct 5; 124(3-4): 187-199. ISSN: 0304-4017
Descriptors: camels, *Trypanosoma evansi*, surra, trypanosomiasis, disease detection, diagnostic techniques, polymerase chain reaction, PCR, agglutination tests, antibody detection, disease prevalence, seroprevalence, gender differences, animal age, hematocrit, card agglutination tests, micro-hematocrit centrifugation technique, mouse inoculation bioassay, Kenya.

Radfar, MH; Nezhat Iranyar. **Biochemical profiles of hydatid cyst fluids of *Echinococcus granulosus* of human and animal origin in Iran.** *Veterinarski Arhiv.* 2004; 74(6): 435-442. ISSN: 0372-5480. Note: In English with a summary in Croatian.
Abstract: A comparative study on the biochemical parameters of the hydatid cyst fluids from sheep, goat, camel, cattle and human cystic forms of *Echinococcus granulosus* was conducted in Iran. Quantitative variations in the levels of glucose, calcium and creatinine in the cystic

fluids from camels compared with those from sheep, goat, cattle and humans were found. These differences were statistically significant (P<0.05). Similarities in the biochemical composition of the hydatid cyst fluids from sheep, goat, cattle and humans suggest the existence of sheep strains of *E. granulosus*. The difference in the biochemical composition of the hydatid cyst fluids from camel with other domestic animals and humans suggests the existence of camel strains of *E. granulosus* in Iran. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, sheep, humans, *Echinococcus granulosus*, hydatid, diagnosis, diagnostic techniques, cysts developmental stages, biochemistry, biological fluids, calcium, creatinine, differential diagnosis, echinococcosis, glucose, strain differences, strains, dextrose, hydatidosis.

Arabian: Drugs

2008

Bengoumi, M; Hidane, K; Bengone Ndong; Gool, F van; Alvinerie, M. **Pharmacokinetics of eprinomectin in plasma and milk in lactating camels (*Camelus dromedarius*).** *Veterinary Research Communications.* 2007; 31(3): 317-322. ISSN: 0165-7380
DOI: http://dx.doi.org/10.1007/s11259-006-3284-6
Abstract: This study was conducted to investigate the disposition kinetics of eprinomectin in the plasma and milk of dromedaries (n=5) following a pour-on administration at the recommended dose for cows (0.5 mg/kg). The plasma eprinomectin concentration reached its peak value (C< sub>max</ sub>) of 1.83+or-1.38 ng/ml at 1.50+or-0.35 days (t< sub>max</ sub>). The area under the curve (AUC) was 6.28+or-4.81 (ng day)/ml and the mean residence time (MRT) was 5.30+or-2.44 days. The Cmax, t< sub>max</ sub>, AUC and MRT for milk were 3.09+or-1.34 ng/ml, 1.90+or-1.19 days, 13.12+or-3.68 (ng day)/ml and 6.79+or-3.21 days, respectively. The AUC milk/plasma ratio was 2.88+or-1.55. It was concluded that eprinomectin could be used safely in the camel with zero-milk withdrawal time. Reproduced with permission of CAB.
Descriptors: dromedary camels,blood plasma, camel milk, dosage effects, eprinomectin, pharmacodynamics, pharmacokinetics, potency, mechanism of drug action.

Elghazali, M.; Barezaik, IM; Hadi, AA Abdel; Eltayeb, FM.; Al Masri, J; Wasfi, IA. **The pharmacokinetics, metabolism and urinary detection time of tramadol in camels.** *Veterinary Journal.* 2008; 178(2): 272-277. ISSN: 1090-0233
Descriptors: dromedary camels, analgesic drug, pharmacokinetics of tramadol, intravenous administration, intramuscular dosing, metabolism, urinary detection time for drug, plasma drug levels, N,O desmethyltramadol, bioavailability.

Elghazali, M; Wasfi, IA.; Hadi, A A Abdel; Latum, AM. **Pharmacokinetic, metabolism and withdrawal time of orphenadrine in camels (*Camelus dromedarius*) after intravenous administration.** *Research in Veterinary Science.* 2008; 85(3): 563-569. ISSN: 0034-5288
NAL call no: 41.8 R312
Descriptors: dromedary camels, 6 animals, pharmacokinetics of orphenadrine, (ORPH), muscle relaxant drug, anticholinergic drug, antihistamine drug, antiparkinsonian drug, single intravenous (i.v.) dose, plasma levels, liquid liquid extraction method, gas chromatography/mass spectrometry, elimination half-life, total body clearance, urine testing.

Goudah, A; Abo ElSooud, K. **Pharmacokinetics and milk penetration of orbifloxacin after intravenous and intramuscular injections to dromedary lactating camels (*Camelus dromedaries*).** *Journal of Veterinary Pharmacology and Therapeutics.* 2008 June; 31(3): 276-280. ISSN: 0140-7783
DOI: http://dx.doi.org/10.1111/j.1365-2885.2008.00954.x

NAL call no: SF915.J63
Abstract: In this study, orbifloxacin was intravenously (i.v.) and intramuscularly (i.m.) administered to 6 healthy female lactating dromedaries at 2.5 mg/kg body weight. Blood and milk samples were obtained at regular intervals to measure the concentrations of orbifloxacin using a modified agar diffusion bioassay method. It was shown that there were significant differences between i.v. and i.m. routes of administration for the distribution and elimination rate constants and half lives. Plasma orbifloxacin concentrations vs. time decreased in a bi-exponential manner after i.v. injection. Mean terminal elimination half life was at 5.7+or-1.16 h. Following i.m. injection, the time of maximum orbifloxacin concentration was 1.52+or-0.41 h and a mean half life of 5.72+or-1.17 h. The systemic bioavailability of orbifloxacin after i.m. injection was 97.47+or-11.32%. Orbifloxacin penetration from the blood to the milk was rapid and showed high concentrations (1.29+or-0.42 micro g/ml). These results indicate that milk from camels treated with orbifloxacin should not be consumed for 2 days after drug treatment. Reproduced with permission of CAB.
Descriptors: femaledromedary camels, veterinary drugs, quinolones antibiotics, food safety, drug evaluation, pharmacokinetics, lactation, adsorption, mammary glands, camel milk, bioavailability, drug excretion, dosage, drug injection, intravenous injection, intramuscular injection, biomarkers, blood plasma, chemical concentration, drug residues, orbifloxacin.

Goudah, A. **Pharmacokinetic parameters of ceftriaxone after single intravenous and intramuscular administration in camels (*Camelus Dromedarius*).** *Research in Veterinary Science.* 2008 June; 84(3): 483-489. ISSN: 0034-5288
DOI: http://dx.doi.org/10.1016/j.rvsc.2007.07.005
NAL call no: 41.8 R312
Abstract: The purpose of this study was to investigate the plasma disposition kinetics of ceftriaxone in female camels (n = 5) following a single intravenous (i.v.) bolus or intramuscular (i.m.) injections at a dosage of 10 mg kg-1 body weight in all animals. A crossover design was carried out in two phases separated by 15 days. Jugular blood samples were collected serially for 48 h and the plasma was analysed by high-performance liquid chromatography (HPLC). Following single i.v. injections the plasma concentration time curves of ceftriaxone were best fitted to a two-compartment model. The drug was rapidly distributed with half-life of distribution t1/2 of 0.24 pl 0.01 h and moderately eliminated with elimination rate constant and elimination half-life of 0.27 pl 0.13 h-1 and 2.57 pl 0.52 h, respectively. The volume of distribution at steady state (Vdss) was 0.32 pl 0.01 l kg-1 and the total body clearance (Cltot) was 0.11 pl 0.01 l kg-1 h-1, respectively. Following i.m. administration, the mean Tmax, Cmax, t1/2el and AUC values for plasma data were 1.03 pl 0.23 h, 21.54 pl 2.61 og ml-1, 1.76 pl 0.03 h and 85.82 pl 11.21 og ml-1 h-1, respectively. The i.m. bioavailability was 93.42 pl 21.4% and the binding percentage of ceftriaxone to plasma protein was moderate, ranging from 33% to 42% with an average of 34.5%.
Descriptors: female camels, plasma disposition kinetics, ceftriaxone,intravenous bolus, intramuscular injections, jugular blood sampling, serial collection in 48 hours, plasma analysis.

2007

Al Mubarak, AI. **Experimental study on sedative effect of detomidine in camels (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2007; 14(2): 151-154. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The sedative effect of detomidine was investigated in 2 groups of camels. The 1st group received 0.05, 0.11, 0.22 mg kg-1 of detomidine in 3 different trials to indicate the optimum dose, while the 2nd group received 0.25 mg kg-1. Score of sedation and other measurements were taken. The results of this study concluded that the detomidine at the doses used did not provide sufficient sedation at its lower dose limit and it was safe at a dose of 0.25 mg kg-1. Reproduced with permission of CAB.
Descriptors: dromedary camels, detomidine, drug therapy, neuroleptics, sedation scores, pharmacology.

Al Mubarak, AI. **Effects of some anaesthetics and chemical restraints on blood clotting in camels.** *Journal of Animal and Veterinary Advances*. 2007; 6(1): 33-35. ISSN: 1680-5593
Abstract: The effects of propionylpromazine, xylazine, detomidine and ketamine administration at therapeutic doses on blood clotting variables were investigated in 16 camels. Four drugs were administered once to 4 animals by the intramuscular route: 0.5 mg/kg propionylpromazine (Compelen, Bayer); 0.25 mg/kg xylazine (Xylazil, Ilium); 15 mg/kg detomidine (Domosedan, Farmos); and 2.5 mg/kg ketamine (Ketamil, Ilium). Blood clotting time, activated clotting time, template bleeding time, prothrombin time, partial thromboplastin time, reptilase time, fibrin degradation products and platelet count were unaffected by the administration of anaesthetics. Only the platelet count was significantly ($P<0.05$) affected by xylazine treatment. Such effects might be due to haemodilution or increase spleen storage function caused by xylazine. Reproduced with permission of CAB.
Descriptors: dromendary camels, anesthesia, anesthetics, blood coagulation,detomidine, fibrin, fibrinolysis, hematology, ketamine, platelet count, potency, prothrombin, thromboplastin, xylazine, anesthesia, anesthetics, clotting system, hematology, propionylpromazine.

Al Nazawi, MH. **Effect of urinary acidifiers and alkalisers on urinary excretion of ampicillin sodium in camel.** *Journal of Camel Practice and Research.* 2007; 14(1): 17-19. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The manipulation of camel urine pH and its effect on urine disposition of ampicillin in camels was studied. Urine alkalinity (pH 8.5) was achieved by oral administration of 900 mg of sodium bicarbonate/kg/day (5 animals). Urine acidity (pH 4.5) was achieved by oral administration of 800 mg of ammonium chloride/kg/day (5 animals). Normal urine (pH 7.4) was achieved by oral administration of normal saline (5 animals, controls). Ampicillin was administered intravenously to camels at a single dose of 4 mg/kg body weight. Ampicillin kinetics was estimated by microbiological method using *Bacillus subtilis* as a test organism. The mean percentage dose of ampicillin excreted unchanged in urine over 8 h was 19.3+or-0.3, 19.7+or-0.3, 18.9+or-0.2% in normal, alkaline and acidic urine, respectively. The maximum peak of excretion was 0.29, 0.31 and 0.30 mg/ml in normal, alkaline and acidic urine, respectively. The time taken to reach that peak of excretion was 5, 5.3 and 5.1 h

in normal, alkaline and acidic urine, respectively. The half life of the drug was 0.277, 0.271 and 0.274 h in normal, alkaline and acidic urine, respectively. These results indicate that changes in urinary pH over the range studied does not affect ampicillin kinetics in camel urine. Reproduced with permission of CAB.
Descriptors: dromedary camels, ampicillin, mechanism of drug actions, changing pH of urine, effects of pH on drug excretion, acidity, alkalinity, ammonium chloride; pharmacodynamics, pharmacokinetics, sodium bicarbonate, *Bacillus subtilis* as test organism.

Antoine Moussiaux, N; Faye, B; Vias, GF. **Tuareg ethnoveterinary treatments of camel diseases in Agadez area (Niger)**. *Tropical Animal Health and Production.* 2007 Feb; 39(2): 83-89. ISSN: 0049-4747
DOI : http://dx.doi.org/10.1007/s11250-007-4404-1
NAL call no : SF601.T7
Abstract: For generations, nomadic herders have been learning to manage herd health, particularly in dromedaries because of their great value. Owing to the unavailability of veterinary services, camel herders in remote areas have been developing their own pharmacopoeia and veterinary techniques. The bleeding of sick animals is a common treatment, as Tuareg herders believe that 'tainted blood' (izni) is the cause of many conditions. Several surgical techniques are also used, such as excision of calcified sublingual cord. The remedies mentioned in this survey are derived from *Maerua crassifolia*, *Boscia senegalensis*, *Acacia raddiana*, *Cucumis prophetarum*, *Calotropis procera*, *Ricinus communis*, *Citrullus colocynthis*, green tea, millet, tobacco and onions. Artificial elements are also used for treatment of animals: Powders collected from batteries, various haircare or skincare creams, crushed glass, insecticides or motor oil belong to their pharmacopoeia. This broadmindedness allows the introduction of modern veterinary medicine. Factors such as the lack of real production objectives constitute limits to this progress, however.
Descriptors: camels, herd health, nomadic Tuareg, ethnoveterinary, ethnobotany, ethno remedies, pharmacopoeia, non-organic items, Niger.

El Aty, AMA; Goudah, A; Shah, SS; Shin, HC; Shimoda, M; Shim, JH. **Pharmacokinetic variables of moxifloxacin in healthy male camels following intravenous and intramuscular administration.** *Journal of Veterinary Pharmacology and Therapeutics.* 2007; 30(6): 586-591. ISSN: 0140-7783
Abstract: In this study, a single dose of moxifloxacin at 5 mg/kg body weight was administered intravenously (i.v.) and intramuscularly (i.m.) 15 days later in 6 male dromedaries aged 6-8 years. Blood samples were analysed before and at regular intervals after administration using a modified agar diffusion bioassay. It was shown that the mean serum concentrations of the drug after i.v. administration were higher than those after i.m. administration until 2 h posttreatment, and were detectable up to 36 h later. Mean terminal half life in the serum was 12.26+or-5.83 h and clearance of 0.34+or-0.02 litres/h/kg. For i.m. administration, time of maximum concentration was 1.04+or-0.14 h, terminal half life was 11.95+or-4.61 h and a bioavailability of 82.10+or-5.50%. In vitro serum binding ranged from 33-38%. No adverse effects were observed in all animals. Reproduced with permission of CAB.
Descriptors: dromedary camels, bioavailability, blood chemistry, dosage, drug metabolism,

fluoroquinolones, intramuscular injection, intravenous injection, pharmacodynamics, pharmacokinetics, drug actions, mechanism of drug action, moxifloxacin.

Foster, A; Jackson, A; D'Alterio, GL. **Skin diseases of South American camelids.** *In Practice.* 2007; 29(4): 216-223. ISSN: 0263-841X
URL: http://www.bvapublications.com
Abstract: Camelids, and alpacas in particular, are growing in popularity in the UK. These animals often present with skin disease and provide a diagnostic and therapeutic challenge for the veterinary clinician. While much has been made about the role of nutritional problems related to zinc, dermatological problems in these species are frequently associated with chronic infestation with Chorioptes mites. The use of macrocyclic lactones and other products may readily treat infestations with other ectoparasites, such as Psoroptes and Sarcoptes mites, but these agents may have to be administered repeatedly to reduce the population of Chorioptes mites. This article describes the most common ectoparasitic conditions seen in South American camelids in the UK as well as some less common problems associated with nutrition, infections, neoplasia and immune-mediated disease, and discusses an approach to the diagnosis and management of skin disease in these species. Reproduced with permission of CAB.
Descriptors: dromedary camels, skin diseases, skin parasites, autoimmune diseases, bacterial diseases, ectoparasites, ectoparasiticides, fungal diseases, infestation, metabolic disorders, fungi, neoplasms, parasitoses, scabies, *Sarcoptes,* cancers, diagnosis, treatment, *Chorioptes*, *Psoroptes*, United Kingdom, South America.

Goudah, A**. Pharmacokinetics of ceftiofur after single intravenous and intramuscular administration in camels (*Camelus dromedarius*).** *Journal of Veterinary Pharmacology and Therapeutics.* 2007 Aug; 30(4): 371-374. ISSN: 0140-7783
DOI: http://dx.doi.org/10.1111/j.1365-2885.2007.00861.x
NAL call no: SF915.J63
Descriptors: dromedary camels,pharmacokinetics, veterinary drugs, drug evaluation, ceftiofur, clinical trials, intravenous injection, intramuscular injection.

Mohsen, HM; Marzok, MA; Abuzead, SMM. **Sedative, analgesic, hematological and biochemical effects of romifidine in camels (*Camelus dromedarius).*** *Veterinary Medical Journal Giza.* 2007; 55(1): 9-23. ISSN: 1110-1423. Note: In English with an Arabic summary.
Abstract: The present study was done on 12 clinically normal dromedary camels. The main objective was to evaluate the clinical usefulness sedative, analgesic, haematological and biochemical effects of 3 dose rates of romifidine administrated intravenously (IV). Camels were divided into 3 groups. Each group (n=4) was specified for one dose level of romifidine (40, 80 and 120 micro g/kg body weight). Heart and respiratory rates, ruminal movements, muscle relaxation, response to auditory and tactile stimulations and degree of ataxia were recorded immediately (time 0) before administration of romifidine, 15, 30, 45, 60, 90, 120 and 180 minutes. The time of onset, degree and duration of sedation and analgesia were recorded for 3 h after drug administration. Blood samples were collected at the same times of the clinical observations for determination of haemoglobin (Hb %), packed cell volume (PCV %), RBCs and WBCs counts. Blood plasma was analysed for blood glucose concentra-

tion. Blood serum was also analysed for blood urea nitrogen and creatinine concentrations. The obtained results indicated significant decreases in heart rate, ruminal movement, head height and response to auditory and tactile stimuli. Meanwhile, significant increases the in degree of ataxia, distance between the ear tips and blood glucose concentration were recorded after administration of romifidine. No significant changes in rectal temperature, respiratory rate, Hb %, PCV %, WBCs and RBCs counts and blood creatinine or blood urea nitrogen levels were recorded in all of the three tested doses. In conclusion, IV administration of romifidine seemed to be safe and effective sedative and analgesic agent for camels. Optimal sedation was achieved with IV doses of 80 micro g/kg, while a dose of 120 micro g/kg revealed profound sedation and analgesia.
Descriptors: dromedary camels, analgesics, pain killer, romfidine, drug mode of action, pharmacodynamics, pharmacokinetics, ataxia, blood chemistry, blood sugar, hematology, heart rate, neuroleptics.

Rani, RU; Kathiresan, D; Sivaseelan, S. **Xylazine sedation in camels.** *Indian Veterinary Journal.* 2007; 84(3): 258-260. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Six camels from Madurai, Tamil Nadu, India were analysed to determine the physiological effect of xylazine. All the animals were intramuscularly treated with xylazine at 0.25 mg/kg body weight. The heart rate, respiratory rate and rectal temperature were examined before and after 15, 30, 45, 60, 75, 90 and 105 min administration. Results revealed that the mean values for onset of weak time, down time and recovery time were 9.08+or-0.54, 11.08+or-0.57 and 91.67+or-2.99 min, respectively. The analgesic effects remained between 50 and 75 min. The sedation induced by xylazine was characterized by non significant change in heart rate, respiratory rate and rectal temperature, and there were no complications observed. It is suggested that the combination of xylazine sedation and local infiltration anaesthesia could be used for conducting various minor surgical procedures in camels.
Descriptors: camels, xylazine, pre-anesthetic medication, analgesic properties, body temperature, heart rate, respiration, drug combinations, neuroleptics, preanaesthetic medication.

Singh, I; Khurana, R; Khokhar, RS. **Comparative therapeutic efficacy of ivermectin, doramectin and carbaryl in camel mange.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 218-220
Abstract: The present study was conducted in 20 camels naturally affected with sarcoptic mange and divided randomly into 4 groups A, B, C and D with 5 camels in each group. In addition, 5 healthy camels were kept as negative control and assigned group E. Group A camels were given two ivermectin injections @ 200 micro g per kg wt s/c at an interval of two weeks. Similarly group B camels were given two doramectin injections @ 200 micro g per kg wt i/m at an interval of two weeks. Camels of group C were sprayed with 0.5 per cent carbaryl weekly for 5 weeks. Group D camels were not given any treatment and kept as positive infected control. The animals were examined weekly for recovery by clinical signs, symptoms and by examination of multiple skin scrapings to see the comparative efficacy of different treatments. Clinical improvement was observed in groups A and B after second

injection of ivermectin and doramectin, respectively. The recovery was evidenced by absence of pruritus, growth of new hair, healing of wounds, improvement in general condition of the animals and absence of mites in skin scrapings. Complete recovery was also observed in camels of group C but only after 4 weeks of spray of carbaryl. However, the recovery was faster in camels given ivermectin and doramectin in comparison to camels sprayed with carbaryl. From the present study, it can be concluded that both ivermectin and doramectin are equally effective and either of these can be used as drug of choice along with spray of an insecticide like carbaryl for treatment of camels affected with sarcoptic mange. Reprodued with permission of CAB.
Descriptors: camels, *Sarcoptes scabiei*, carbaryl, doramectin, mange treatments, drug therapy, ivermectin, potency, recovery, Haryana, India.

Tuteja, FC; Dixit, SK. **Studies on treatment and control of intramammary infections in camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 27-30.
Abstract: Systemic administration of antibiotics and feeding of minerals for the treatment and control of intramammary infections was studied. In the treatment of apparently healthy but culturally positive quarters, combination of amoxycillin and cloxacillin resulted in 69.23% clearance of infections and its efficacy was improved to 84.61% when given along with vitamin-E and selenium. Whereas, the overall efficacy of treatment with ascorbic acid alone was 46.1%. In the treatment of culturally positive and apparently clinical quarters, enrofloxacin resulted in 77.77% clearance of infections. The lower infection rate in milking animals as compared to drying off animals shows flushing action of milking. Daily feeding of Cu, Zn and Se for 30 days resulted in almost 40% reduction of infections.
Descriptors: dromedary camels, amoxicillin, antibiotics, ascorbic acid, cloxacillin, disease control, drug combinations, drug therapy, enrofloxacin, feed supplements, mammary gland diseases, mastitis, minerals, multiple drug therapy, nutritional support, potency, selenium, trace elements, vitamin E, zinc, copper, *Corynebacterium,Micrococcus* bacteria, *Staphylococcus*, *Streptococcus*, amoxicillin, cloxicillin, chemotherapy, combination drug therapy, microelements, vitamin C.

Vincke, C; Pellis, M; Baral, TN; Stijlemans, B; Tillib, S; Rothbauer, U; Leonhardt, H; Conrath, K; Magez, S; Wernery, U; Baetselier, P de; Muyldermans, S. **Camel antibodies for therapeutic and research applications.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 71-75.
Abstract: All camelids and dromedaries in particular have unique antibodies circulating in their blood. Unlike antibodies from all other species these special antibodies are devoid of light chains, and are composed of a heavy chain dimmer only. An immune response is raised in these so-called Heavy-Chain Antibodies (HCAb) following a classical immunisation protocol. These HCAb are easily purified from serum, and were shown to interact with parts of the antigen that are less antigenic to conventional antibodies. Therefore a new class of antibodies is obtained that binds to epitopes that are difficult to target with human or mouse antibodies. Since the antigen binding site of the dromedary HCAb is comprised within one

single domain, referred to as VHH or Nanobody (Nb, because of its size in the nm range), we designed a strategy to clone the Nb repertoire of an immunised dromedary and to select the Nbs with specificity for our target antigens. These monoclonal Nbs are well produced in bacteria, are very stable and highly soluble, and they bind the antigen with high affinity and specificity. Currently, we successfully developed such recombinant Nbs as probe in biosensors or to diagnose infections. In addition, the strict monomeric behaviour of Nbs make them ideal for linkage to other molecules exerting special effector function, to generate pluripotent and multidomain man-made drugs to treat diseases like cancer or trypanosomiasis. Reproduced with permission of CAB.
Descriptors: dromedary camels, animal health, antibodies, antigens, immune response, immune serum, immunity, immunization, therapy, antigenicity antiserum, immune sensitization, immunity reactions, immunogens, immunological reactions, therapeutics.

Wasfi , IA ; Elghazali, M; Hadi, AAA; Agha, BA; Barezaig, IM. **The pharmacokinetics and metabolism of ranitidine in camels.** *Journal of Camel Practice and Research.* 2007; 14(2): 155-160. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The pharmacokinetics of ranitidine was studied in camels following intravenous (i.v., n=6) administration of a dose of 2.2 mg/kg body weight. The concentrations of plasma ranitidine were determined using a validated reverse-phase, high-performance liquid chromatography. A bi-exponential equation Cp=A1 x e-k1t+A2 x e-k2t, best described data for all camels. The data obtained (mean +or- SD) after i.v. administration were as follows: the terminal elimination half-life was 3.25 (0.79) h and total body clearance was 415.7 (35) ml/h/kg. The volume of distribution at steady state was 1428 (386) ml/kg, the volume of the central compartment of the 2 compartment pharmacokinetic model was 292 (94) ml/kg. Furthermore, the metabolites of ranitidine were investigated in urine by LC-MS analysis. Three metabolites were tentatively identified from their mass spectra, two of which were hydroxy ranitidine which appeared at different retention times and a third was identified as desmethylranitidine. Reproduced with permission of CAB.
Descriptors: dromedary camels, drug metabolism, drugs, metabolic inhibitors, pharmacokinetics, antimetabolites, medicines, pharmaceuticals, ranitidine.

2006

Al Katheeri, NA; Wasfi, IA; Lambert, M; Albo, AG; Nebbia, C. **In vivo and in vitro metabolism of dexamethasone in the camel.** *Veterinary Journal.* 2006 Nov; 172(3): 532-543. ISSN: 1090-0233
DOI: http://dx.doi.org/10.1016/j.tvjl.2005.06.003
NAL call no: SF601.V484
Abstract: The metabolism of dexamethasone (DXM) in the camel was assessed by in vivo and in vitro techniques. Liver samples were collected at the abattoir from camels of either sex, and microsomes were isolated and characterized as to their protein and haemoprotein content as well as for their ability to metabolise several cytochrome P450 model substrates. The expression of different P450 enzymes was evaluated by means of immunoblotting, and

the glucuronidating capacity was assessed with 1-naphthol as the substrate. The activity of 11(Sb(B-hydroxysteroid dehydrogenase type 1 was assayed using metyrapone as a model substrate. To examine the in vitro metabolism of DXM, microsomes were incubated with the corticoid in the presence of either a NADPH-generating system or of uridindiphosphoglucuronic acid. In vivo metabolism of DXM was studied in two male camels, injected with a bolus intravenous dose of DXM (0.2 mg/kg body weight) and DXM metabolites were evaluated in urine samples collected at different times after the administration. DXM and metabolites were extracted using solid phase and liquid-liquid extraction, and analysed by liquid chromatography mass spectrometry (LC/MS) and by LC/MS/MS. Comparative results were obtained by in vitro and in vivo studies. Two phase I metabolites were detected: the major one resulted from reduction of the 3-carbonyl group in ring A and the minor metabolite from ring hydroxylation of ring A. Glucuronidation involved both phase I metabolites as well as the parent compound.
Descriptors: camels, drug metabolic studies, dexamethasone, in vivo studies, in vitro studies, liver microsomes, drug excretion.

Al Tarazi, YH; Elsheikh, HA; Abu Basha, EA; Al Majali, AM. **Pharmacokinetics and bioavailability of gentamicin after a single intravenous and intramuscular administration in camels (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2006; 13(2): 135-140. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The pharmacokinetics and bioavailability of gentamicin sulfate 4% (GENTAYET, 3 mg/kg body weight) were studied in 5 healthy male camels (C. dromedarius) after a single intravenous (IV) and intramuscular (IM) administration according to a crossover randomized design. Gentamicin concentrations were determined using a microbiological assay and *Bacillus subtilis* (ATCC 6633) as a test organism. The disposition curves were analysed using non-compartmental methods based on statistical moment theory. Following single IV administration, the elimination half life (t< sub>1//2</ sub>b), mean residence time (MRT), volume of distribution at steady state (Vd< sub>ss</ sub>), volume of distribution (Vd< sub>area</ sub>) and the total body clearance (Cl< sub>B</ sub>) were 5.98+or-0.42 h, 6.73+or-0.37 h, 0.28+or-0.02 litres/kg, 0.36+or-0.02 litres/kg and 0.71+or-0.02 ml/min/kg, respectively. After a single IM administration, the maximum plasma concentrations (C< sub>max</ sub>) was 6.26+or-0.36 mg/ml achieved at (t< sub>max</ sub>) 2 h postinjection time. The t< sub>1//2</ sub>b, MRT, Vd< sub>area</ sub>, Cl< sub>B</ sub> and the absolute bioavailability (F) were 5.24+or-0.31 h, 7.87+or-0.35 h, 0.42+or-0.03 litres/kg, 0.95+or-0.05 ml/min/kg and 75.56+or-4.92%, respectively. Based on these kinetics parameters, a dosage of 3 mg/kg by IM and IV administration every 24 h can be recommended for the treatment of bacterial infections in camels with MIC< sub>90</ sub>30.75 and 3.75 mg/ml, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Bacillus subtilis*, bioavailability, blood chemistry, drug metabolism, drug therapy, gentamicin, intramuscular injection, intravenous injection, pharmacodynamics, pharmacokinetics, tissue distribution.

Al Wabel, NA. **Comparative activities of semicarbazide-sensitive amine oxidase (SSAO) in five domestic species.** *Polish Journal of Veterinary Sciences.* 2008; 11(1): 63-66. ISSN: 1505-1773
Descriptors: camels, horses, cattle, goat, sheep, males, females, serum testing for semicarbazide-sensitive amine oxidase (SSAO) activity, spectrophotometric analysis, benzylamine as a substrate, comparative activity.

Cebra, C. **Practical fluid therapy.** *Large Animal Proceedings of the North American Veterinary Conference, Volume 20, Orlando, Florida, USA, 7-11 January, 2006.* 2006; 273-274.
URL: http://www.tnavc.org
Descriptors: dromedary camels, alpacas, dehydration, fluid therapy, oral rehydration solutions, drug delivery.

Hunter, A (Editor). ***La Sante Animale. Volume 2. Principales Maladies. [Animal Health. Volume 2. Principal Diseases.]*** Published by Editions Quae, Versailles. 2006; 310 pp. ISBN: 2759200051; 9782759200054. Note: In French.
Abstract: The first volume of this work considered the fundamentals of animal pathology and the principles of disease control; volume 2 considers the most important diseases of livestock in the tropics and subtropics in more detail. Each disease is described with reference to its symptoms, aetiology, mode of transmission, treatment and prevention. The first part covers infectious and contagious diseases (viral and bacterial diseases, coccidiosis and dermatomycoses) of livestock in general, bovines, small ruminants, camels, equines and pigs. Part 2 covers venereal and congenital infections; part 3 describes arthropod parasites (flies, lice, fleas, ticks and mange mites). Vector-borne diseases of livestock in general, small ruminants and equines are considered in part 4, helminths and helminthoses in part 5, and environmental and other diseases (metabolic disorders, neoplasms, nutritional deficiency and poisoning) in part 6. This book is intended for use by veterinary technicians and agricultural advisors, and as a textbook in higher education. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, horses, pigs, sheep, pigs, livestock animal diseases, bacterial diseases, clinical aspects, coccidiosis, deficiency diseases, animal disease transmission, drug therapy, ectoparasites, helminthes, infectious diseases, metabolic disorders, poisoning, prophylaxis, tropics, vector borne diseases, viral diseases, bacterial infections, bacterioses, chemotherapy, clinical picture, communicable diseases, parasitic worms, toxicosis, tropical countries, viral infections.

Laraje, R; Talmi, A; Bounaga, R; Bengoumi, M; El Hraiki, A; Laurentie, M. **Comparative pharmacokinetics of marbofloxacin after a single intramuscular administration at two dosages to camels (*Camelus dromedarius*).** *Journal of Veterinary Pharmacology and Therapeutics*. 2006 June; 29(3): 229-231. ISSN: 0140-7783
DOI: http://dx.doi.org/10.1111/j.1365-2885.2006.00739.x
NAL call no: SF915.J63
Abstracts: Five healthy male camels were administered a 10% aqueous solution of marbofloxacin (Vetoquinol) at 4 mg/kg body weight intramuscularly (i.m.) on the right thigh. After 2 weeks, a dosage of 2 mg/kg was administered to the same animals. Blood samples were collected before and at 5, 10, 15, 30 and 45 min and 1, 2, 3, 4, 6, 8, 12, 16, 24, 36, 48, 72 and 96 h after administration and analysed for marbofloxacin concentration by reverse phase

HPLC. It was shown that the mean residence time, half life of absorption and terminal half life of marbofloxacin did not differ significantly between dosages but peak plasma concentration and area under curve values differed. The pharmacokinetics of marbofloxacin in the camels was characterized by a high peak plasma concentration and area under curve, rapid absorption following i.m. administration and a longer terminal half life. Reproduced with permission of CAB.
Descriptors: camels, pharmacokinetics, quinolones, dosage, dosage effects, drug delivery systems, drug injection, intramuscular injection, absorption, minimum inhibitory concentration, dose response, veterinary medicine, livestock, marbofloxacin.

Lashev, L; Haritova, A. **Comparative allometric analysis of pharmacokinetics of florfenicol and tiamphenicol.** *Bulgarian Journal of Veterinary Medicine*. 2006; 9(2): 115-122. ISSN: 1311-1477
URL: http://tru.uni-sz.bg/bjvm/bjvm.htm
Abstract: Comparative investigations upon the allometric relationships between several pharmacokinetic parameters of florfenicol and tiamphenicol and the body weight of various mammalian species have been performed. The resulting allometric equations were as followed: for tiamphenicol, total body clearance Cl< sub>B</ sub>=16.44.W0.80, volume of distribution at steady state Vss=0.95.W0.95; biological half-life t< sub>1/2</ sub>=0.82. W0.16. For florfenicol, the respective equations were Cl< sub>B</ sub>=6.22.W0.95; Vss=0.92.W0.97, where Cl< sub>B</ sub> - total body clearance, Vss - volume of distribution at steady state, t< sub>1/2</ sub> - biological half-life, W - body weight. The biological half-life of florfenicol was not statistically significantly dependent on body weight, but the coefficients were similar to those for tiamphenicol and depended on species included in the calculations. It is suggested that there were no statistically significant differences in the pharmacokinetics of both antibiotics and therefore, florfenicol should be preferred because of its pharmacodynamics.
Descriptors: dromedary camels, cattle, horses, pigs, rabbits, sheep, florfenicol, intravenous injection, livestock, liveweight, mathematical models, pharmacodynamics, pharmacokinetics, mechanism of drug action, tiamphenicol.

Mahfooz, A; Abubakar, M; Bilal, MQ; Ahmad, T. **Prevalence and chemotherapy of gastrointestinal parasites in camels in and around Faisalabad, Pakistan.** *Pakistan Veterinary Journal.* 2006; 26(4): 209-210. ISSN: 0253-8318
Abstract: The prevalence of gastrointestinal (GI) parasites and the efficacy of Dectomax (doramectin) against them were studied. 50 camels were selected from different localities of Faisalabad. Faecal samples were collected and examined for the presence of parasites. The overall prevalence of GI parasites was 60%. The prevalences of *Haemonchus*, Trichostrongylus, *Strongyloides*, *Ostertagia*, *Moniezia expansa* and mixed infections were 20, 14, 8, 4, 4 and 10%, respectively. The efficacy of Dectomax was 75-90%, and it might be used for the treatment of GI parasites in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels,digestive tract, disease prevalence, disease surveys, doramectin, drug therapy, mixed infections, *Haemonchus*, *Moniezia expansa*, *Ostertagia*, *Strongyloides*, *Trichostrongylus,* chemotherapy, disease surveillance, gastrointestinal tract, multiple infections, *Rhabditida*, *Secernentea*, *Strongylida,* Pakistan.

Martinez , M; Mahmood, I; Hunter, RP**. Interspecies allometric scaling: prediction of clearance in large animal species: Part II: mathematical considerations.** *Journal of Veterinary Pharmacology and Therapeutics.* 2006 Oct; 29(5): 425-432. ISSN: 0140-7783
DOI: http://dx.doi.org/10.1111/j.1365-2885.2006.00787.x
NAL call no: SF915.J63
Abstract: Interspecies scaling is a useful tool for the prediction of pharmacokinetic parameters from animals to humans, and it is often used for estimating a first-time in human dose. However, it is important to appreciate the mathematical underpinnings of this scaling procedure when using it to predict pharmacokinetic parameter values across animal species. When cautiously applied, allometry can be a tool for estimating clearance in veterinary species for the purpose of dosage selection. It is particularly valuable during the selection of dosages in large zoo animal species, such as elephants, large cats and camels, for which pharmacokinetic data are scant. In Part I, allometric predictions of clearance in large animal species were found to pose substantially greater risks of inaccuracies when compared with that observed for humans. In this report, we examine the factors influencing the accuracy of our clearance estimates from the perspective of the relationship between prediction error and such variables as the distribution of body weight values used in the regression analysis, the influence of a particular observation on the clearance estimate, and the 'goodness of fit' (R superscript 2(B) of the regression line. Ultimately, these considerations are used to generate recommendations regarding the data to be included in the allometric prediction of clearance in large animal species.
Descriptors: elephants, large cats, camels, zoo animals, animals, body weight, pharmacokinetics, dosage, allometry, drug excretion, half life, prediction, equations, mathematical models, risk factors, humans, veterinary medicine, risk reduction, drug therapy, interspecies allometric scaling, body clearance time, correction factors, errors, withdrawal time.

Oukessou, M; Achaaban, MR; Sutra, JF; Alvinerie, M. **A preliminary kinetic study of eprinomectin in the dromedary camel.** *Journal of Camel Practice and Research.* 2006; 13(1): 27-29. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to investigate the effect of the administration site on the plasma kinetics of eprinomectin in 5 dromedary camels following a single pour-on administration (0.500 mg/kg body weight). Three camels received uniformly the drug along the dorsal line, from the base of the tail to the withers, including the hump. The others received the drug dose half administered in the withers region, whereas the other half was given in the croup zone. The obtained results showed that the peak plasma concentration (C< sub>max</ sub>) was about 2-fold higher and the area under plasma concentration curve (AUC) increased by 64% when the hump was excluded from the site of administration. Reproduced with permission of CAB.
Descriptors: dromedary camels, drug delivery systems, drug therapy, eprinomectin, tail, withers, pharmacodynamics, pharmacokinetics, potency, chemotherapy, mechanism of drug action.

2005

Al Nazawi, MH. **Pharmacokinetics of amoxycillin in camel.** *Journal of Biological Sciences.* 2005; 5(2): 149-152

URL: http://www.ansinet.org/jbs

Abstract: The pharmacokinetics of amoxycillin following intravenous (IV) and oral administrations in 10 camel, 2-3 years old and 200-230 kg, was studied. The kinetic behaviour of the drug was best described by a two compartment open model. The half-life of amoxycillin was 3.6+or-0.36 min for IV and 15.3+or-1.9 min for oral dosing. The half-life of elimination were 69.3+or-2.6 and 80.0+or-3.4 min for IV and oral administration, respectively. The mean peak plasma concentration after oral administration was 2.11+or-8.3 micro g/ml detected at 2 h after drug administration and the bioavailability was 23.3%. A mean plasma amoxycillin concentration of 0.5 micro g/ml was maintained for at least 4-6 h after a single IV or oral administration. It seems that such a dose value is needed to be given more than once every 24 h. Reproduced with permission of CAB.

Descriptors: dromedary camels, amoxicillin, amoxycillin, bioavailability, drug delivery systems, intravenous injection, oral administration, drug action, pharmacodynamics, pharmacokinetics, pharmacology.

Al Nazawi, MH; Homeida, AM. **Residues of sulphadimidine and its metabolite N_4-acetyl in camel milk.** *IJP-International Journal of Pharmacology.* 2005; 1(3): 249-251. ISSN: 1811-7775

URL: http://www.ansinet.org/ijp

Abstract: Intravenous administration of sulfadimidine (SDM) at a dose of 50 mg/kg body weight as a single-dose or repeated-dose treatments to lactating dromedary camels resulted in residues of SDM and its metabolite N< sub>4</ sub>-acetyl in milk. Milking twice daily resulted in depletion of SDM and N< sub>4</ sub>-acetyl residue during a withdrawal period of 5 days after the last injection of the drug. Milk protein binding and concentration of the metabolite was very low, suggesting that monitoring of sulfonamide residues in milk could be limited to SDM alone.

Descriptors: dromedary camels, camel milk, contamination, drug residues, metabolites, milk, pharmacodynamics, pharmacokinetics, sulfadimidine, drug action, mechanism of drug action, sulfamethazine, sulphadimidine.

Al Nazawi, MH. **Pharmacokinetics and tolerance of thiamphenicol in camels and sheep.** *IJP International Journal of Pharmacology.* 2005; 1(1): 25-28. ISSN: 1811-7775

URL: http://www.ansinet.org/ijp

Abstract: Pharmacokinetics and tolerance of thiamphenicol (TAP) were investigated in camels and sheep following administration of intravenous dose of 20 mg/kg body weight. Overall, 8 camels (*Camelus dromedarius*) and 8 sheep (Ardy breed) were used. All animals were cannulated under strict aseptic conditions for administration of the drug and collection of blood samples. The blood samples were collected at 0, 5, 10, 15, 30, 45 min and 1, 2, 3, 4, 6, 9, 12 and 18 posttreatment. All collected blood samples were analysed for haematology variables and TAP concentrations were determined using an agar plate diffusion method using Bacillus subtilis (ATCC 6633) as test organism. Results showed that the disposition kinetic of TAP in camels and sheep showed a biexponential profile with elimination half-lives

of 2.11 h for camel and 1.5 h for sheep, and volume of distribution of 1.1 litre/kg for camel and 0.90 litre/kg for sheep, indicating extensive tissue penetration which is consistent with TAP lipophilicity. The drug administered at a dose of 40 mg/kg to camel and sheep produced no changes in haematological and plasma biochemical parameters, suggesting that both species can tolerate higher doses of the drug. Reproduced with permission of CAB.
Descriptors: dromedary camels, sheep, antibacterial-agents, half life, pharmacokinetics, pharmacology, thiamphenicol, tissue distribution, tolerance.

Al Nazawi, MH; Homeida, AM. **Pharmacokinetics and tolerance of chloramphenicol and florfenicol in camels.** *Journal of Camel Practice and Research.* 2005; 12(1): 7-11. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The pharmacokinetics of chloramphenicol and florfenicol following intravenous administration at 5 mg/kg body weight was studied in camels. The plasma concentration versus time were best described by a two-compartment open model. Significantly higher volume of distribution, shorter half-life and body clearance were observed in chloramphenicol when compared with florfenicol. Mean volume of distribution, half-life and body clearance were 0.921 and 0.732 litre/kg, 100 and 138 min, and 0.018 and 0.0037 ml/minute/kg, respectively, for chloramphenicol and florfenicol, respectively. The animals treated intramuscularly with chloramphenicol at 40 mg/kg for 3 successive days had inappetance, dullness and some haematological and biochemical alterations. Florfenicol given at a dose of 200 mg/kg intramuscularly for 3 days was well tolerated. It is recommended that the use of chloramphenicol should be limited in camels unless there is no other effective antibiotic, and that florfenicol is a good substitute.
Descriptors: dromedary camels, chloramphenicol, florfenicol, intravenous injection, adverse effects, drug delivery systems, intramuscular injection, pharmacokinetics, pharmacology.

Antoine Moussiaux, N; Faye, B; Vias, GF. **Tuareg ethnodiagnostic skill of camel diseasein Agadez area (Niger).** *Journal of Camel Practice and Research.* 2005; 12(2): 85-93. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: For generations, nomad herders have been learning to manage herd health, particularly in dromedaries, because of their high value. They have thus acquired a very comprehensive knowledge of signs of illness and have developed their own nomenclature. The present study aims at the description, scientific identification and recognition of this ethnoveterinary knowledge by means of an investigation carried out in Tuareg populations living in the neighbourhoods of Agadez (Niger) in November 2003-January 2004. The dominant pathologies cited by herders for being the most alarming are gastrointestinal helminthoses (izni), camel calf diarrhoea (efay), tick infestations of camel calves (igardan), camel pox (erk eshik), sarcoptic mange (ajud) and bronchopneumonia (toza). Poorly identified nosologic entities are also reported. Reproduced with permission of CAB.
Descriptors: dromedary camels, etiology, camel diseases; herd health management, Tuareg nomads, tracitional medicine, ethnoveterinary knowledge, diagnosis, diarrhea, helminthoses, helminthes, intestinal worms, parasitoses, pneumonia, scabies, Niger.

El Maghraby, HM; Al Qudah, K. **Sedative and analgesic effects of detomidine in camels (*Camelus dromedarius*)**. *Journal of Camel Practice and Research.* 2005; 12(1): 41-45. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com

Abstract: This study was conducted to evaluate the efficacy of various doses of detomidine in camels with special reference to its sedative, analgesic, haematological and biochemical effects. Detomidine hydrochloride was administered intravenously to three groups of camels at 3 different doses (25, 50 or 75 micro g/kg). The levels of sedation and analgesia were graded and recorded. It was observed that sedation and analgesia were dose dependent. Detomidine at 75 micro g/kg produced profound sedation, analgesia, significant hyperglycaemia and bradycardia after administration and lasted until recovery. No significant changes in haemoglobin concentration (Hb%), PCV, WBC, RBC, creatinine and blood urea nitrogen levels were recorded in all dose levels. It is concluded that detomidine is a safe and effective sedative and analgesic for camels. Reproduced with permission of CAB.

Descriptors: dromedary camels, detomidine hydrochloride, iv injection, efficacy, various dosage effects, drug action, sedation levels, analgesia, hyperglycemia, bradycardia, high blood glucose, neuroleptics, pharmacodynamics, pharmacology.

Ghulam Muhammad; Khan, MZ; Hussain, MH; Zafar Iqbal; Muhammad Iqbal; Muhammad Athar. **Ethnoveterinary practices of owners of pneumatic-cart pulling camels in Faisalabad City (Pakistan).** *Journal of Ethnopharmacology.* 2005; 97(2): 241-246. ISSN: 0378-8741

Abstract: The present study was planned to investigate the ethnoveterinary methods practiced by the owners of pneumatic-cart pulling camels in Faisalabad Metropolis (Pakistan). During a 7-year-period (November 1992-November 1999), 200 owners of draught camels working in the city were interviewed. Information concerning the ethnoveterinary practices for the treatment of common disorders of digestive tract (indigestion, colic and diarrhea), respiratory tract (cold/rhinitis, pneumonia), skin problems (mange, ulceration of nostrils with or without nasal myiasis, ticks and lice, harness sores), systemic states (fever, anhidrosis) and preventive therapy of indigestion and halitosis was collected through interviews and collated with those documented for the treatment of desert-dwelling camels. Familiarity of owners with two traditional methods of surra (trypanosomiasis) diagnosis ('Sand-ball test' and 'Hair-stick test') known to pastorilists was also probed. In addition, the dose and frequency of use of common salt was investigated. Traditional inputs utilized by the camel owners included various plant products, insecticides, sulphur, sump oil, common salt, aspirin, naphthalene balls and milk fat. Different owners used different combinations of traditional drugs for the treatment of disorders/conditions investigated. None of the camel owners was found familiar with the 'Sand-ball test' or 'Hair-stick test' of trypanosomiasis diagnosis. For the prevention of indigestion and halitosis all camel owners had practiced administration of 'massaulas' (physic drench/balls) along with common salt (average 250 g) on weekly basis. In general, the ethnoveterinary treatment practices used by the owners of city-dwelling camels appear to be different from those documented for the treatment of diseases of desert-dwelling camels.

Descriptors: draft camels in an urban environment, cart pulling camels, working camels, camel diseases, colic, diarrhea, dyspepsia, mange, parasitoses, parasitic infections, pneumonia, respiratory diseases, rhinitis, skin diseases, harness sores, injuries, *Trypanosoma evansi*, trypanosomiasis, myiasis, causal agents, diagnosis, disease prevention, ethnicity folk medicine,

traditional medicine, ethnic differences, medicinal plants, plant extracts, aspirin, acetylsalicylic acid, insecticides, milk fat, naphthalene, plant extracts, ethnoveterinary care, salt, elemental sulfur, surveys, Pakistan.

Kadja, MC; Biaou, FC; Kane, Y; Kaboret, Y; Pangui, LJ; Abiola, FA. **Efficacite d'une formulation d'anthelminthique injectable a base d'albendazole sulfoxyde sur les nematodes gastro-intestinaux du dromadaire (*Camelus dromedarius*) au Senegal.[Efficacy of an injectable anthelmintic albendazole sulfoxide formulation on gastro-intestinal nematodes of the dromedary (*Camelus dromedarius*) in Senegal.]** *Revue de Medecine Veterinaire*. 2005; 156(6): 332-335. ISSN: 0035-1555. Note: In French with an English summary.
Abstract: In Sub-Saharan Africa, few studies are dedicated to the treatments of diseases in dromedaries. This work was undertaken in order to improve the therapeutic schemes in this species, which appears as a more and more important species. The efficacy of an injectable albendazole sulfoxide formulation was compared with an albendazole bolus on dromedary gastro-intestinal nematodes in Senegal. Parasitologic study by quantitative coproscopy showed that, the injectable formulation of albendazole sulfoxide is effective on the gastro-intestinal nematodes of dromedary. Its efficacy was variable (74 to 100%) according to the methods of calculation used. Thus, injectable albendazole sulfoxide is recommended for the treatment of gastrointestinal nematodes infections in the dromedary. Reproduced with permission of CAB.
Descriptors: dromedary camels, gastrointestinal nematode parasites, albendazole sulfoxide as treatment, injected formulation, drug efficacy, animal parasitic nematodes, helminthes, Senegal.

Muhammad, G; Khan, MZ; Hussain, MH; Iqbal, Z; Iqbal, M; Athar, M. **Ethnoveterinary practices of owners of pneumatic-cart pulling camels in Faisalabad City (Pakistan)** .*Journal of ethnopharmacology.* 2005 Feb 28; 97(2): 241-246. ISSN: 0378-8741
Descriptors: camels, draft animals, traditional medicine, veterinary medicine, indigenous knowledge, medicinal plants, veterinary drugs, therapeutics, ethnoveterinary medicine, city dwelling camels, desert dwelling camels, traditional veterinary drugs, animal owners, Pakistan.

Parmar, AJ; Veer Singh. **Efficacy of doramectin and ivermectin against sarcoptic mange in camels.** *Journal of Veterinary Parasitology.* 2005; 19(2): 159-160. ISSN: 0971-6157
URL: http://www.indianjournals.com/ijor.aspx?target=ijor:jvp&type=home
Abstract: Comparative efficacy of doramectin and ivermectin was studied in camels (*Camelus dromedarius*) naturally infected with sarcoptic mange-mites. Clinically affected camels exhibited pruritus, restlessness, emaciation, alopecia with thick, wrinkled skin over the neck, medial aspect of thigh and brisket region and oozing of serous fluid and blood. Based on the number of days taken for clinico-parasitological cure and time required for complete resolution of skin texture, doramectin was found to be superior to ivermectin. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Sarcoptes scabiei*, clinical aspects, doramectin, ectoparasites, ectoparasitoses, parasitic diseases, clinical picture, doramectin, ivermectin, parasitoses, scabies, clinical picture, parasitic diseases, parasitic infestations.

Rajender Kumar; Gorakh Mal; Sena, DS. **Comparative efficacy of fenvalerate, deltamethrin, amitraz and ivermectin against sarcoptic mange in camel.** *Indian Veterinary Journal.* 2005; 82(1): 88-89. ISSN: 0019-6479

URL: http://www.indvetjournal.com

NAL call no.: 41.8 IN2

Abstract: The objective of this study was to evaluate the efficacy of fenvalerate, deltamethrin, amitraz and ivermectin in controlling sarcoptic mange in camels. 15 camels suffering from sarcoptic mange were divided into 5 groups. Groups I, II and III were sprayed with 500 ppm fenvalerate, 50 ppm deltamethrin and 500 ppm amitraz thrice at an interval of 7 days, respectively. Group IV was subcutaneously administered with ivermectin at 0.02 mg/kg body weight, whereas group V was kept as untreated control. Considerable reduction in mites of all stages was observed after 7 days of treatment in groups I, II and III. Complete recovery was observed after the 3rd spray in groups I, II and III. Group IV camels recovered after a single treatment. After 21 days, no mites were observed in the skin scrapings. The condition of the camels in group V was further aggravated due to intense pruritus.

Descriptors: dromedary camels, *Sarcoptes scabiei*, scabies, pruritus, mange control, drug therapy, amitraz, deltamethrin, fenvalerate, ivermectin, pharmacodynamics, drug action.

Sopyev, B; Divanov, B; Charyev, C. **Diseases of camels, their preventive maintenance and treatment.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 60-66. ISBN: 1586034731

Descriptors: dromedary camels, Bactrian camels, acaricides, brucellosis, clinical aspects, diagnosis, diminazene, disease prevalence, disease prevention, drug therapy, azidine, berenil, hydatid disease, hydatidosis, echinococcosis, epidemiology, helminthoses, licorice, mange, plague, smallpox, trypanosomiasis, vaccination, *Brucella*, *Cephalopina*, *Echinococcus*, *Glycyrrhiza*, *Sarcoptes scabiei*, *Taenia hydatigena*, *Trypanosoma*, *Yersinia pestis*, Turkmenistan, Central Asia.

2004

Al Busadah, KA; Homeida, AM. **Pharmacokinetics of progesterone in dromedary camels (*Camelus dromedarim*).** *Research in Veterinary Science.* 2004; 77(3): 245-247. ISSN: 0034-5288

NAL call no: 41.8 R312

Abstract: The effect of ovariectomy or administration of progesterone (P4) on the disposition kinetics of P4 was determined in dromedary camels. The disappearance of P4 from peripheral circulation of the camel following ovariectomy or after a single intravenous (I.V.) injection of 1 mg kg-1 body weight followed a bioexponential curve. Both curves were parallel indicating that the disappearance of injected P4 behaved similarly to endogenous P4. The mean (+or-SD) half-life calculated from the slower component of this decline, was 26.0+or-2.0 min after I.V. injection of P4 and 28.0+or-2.1 min after ovariectomy. The apparent volume of distribution (1370 ml kg-1) exceeded total body water suggesting extensive tissue penetration. Reproduced with permission of CAB. Reproduced with permission of CAB.

Descriptors: dromedary camels, ovariectomy, pharmacokinetics, pharmacology, progesterone, tissue distribution.

Al Katheeri, NA; Wasfi, IA; Lambert, M; Saeed, A. **Pharmacokinetics and pharmacodynamics of dexamethasone after intravenous administration in camels: effect of dose.** *Veterinary Research Communications* . 2004 Aug; 28(6): 525-542. ISSN: 0165-7380
Descriptors: camels, pharmacokinetics, dexamethasone, intravenous injection, dose response, half life, protein binding, cortisol, lymphocytes, neutrophils, blood glucose, drug evaluation, anti-inflammatory activity.

Al Katheeri, NA; Wasfi, IA; Lambert, M; Saeed, A. **Lack of gender effect on the pharmacokinetics and pharmacodynamics of dexamethasone in the camel after intravenous administration.** *Research in Veterinary Science.* 2004 Aug; 77(1): 73-81. ISSN: 0034-5288
NAL call no: 41.8 R312
Abstract: The pharmacokinetics and pharmacodynamics of dexamethasone were studied in six male and six female camels after a single intravenous dose (0.05 mg kg-1 body weight) of dexamethasone. The pharmacokinetic parameters of the two-compartment pharmacokinetic model for female and male camels, respectively (mean pl SEM) were as follows: terminal elimination half-lives were 8.02 pl 1.15 and 7.33 pl 0.80 h, total body clearances were 95.5 pl 16.0 and 124.5 pl 11.9 ml h-1 per kg, volumes of distribution at steady state were 0.72 pl 0.08 and 0.87 pl 0.14 litre kg-1, and the volumes of the central compartment were 0.12 pl 0.02 and 0.17 pl 0.02 litre kg-1. There was no significant difference in any pharmacokinetic parameter between female and male camels. Pharmacodynamic effects were evaluated by measuring endogenous plasma cortisol, circulating lymphocytes and neutrophils numbers and were analysed using indirect pharmacokinetic/pharmacodynamic models. The estimated IC50 of dexamethasone for cortisol and lymphocytes for female and male camels were 3.74 pl 0.99 and 2.28 pl 1.09 and 2.63 pl 0.71 and 2.41 pl 0.79 ng ml-1, respectively. The EC50 for neutrophils for female and male camels were 24.5 pl 5.83 and 20.2 pl 3.82 ng ml-1, respectively. There was no significant difference in any pharmacodynamic parameter between female and male camels. Dexamethasone in urine could be detected for 4-5 days by enzyme-linked immunosorbent assay and for 3-4 days by liquid chromatography/mass spectrometry after an intravenous dose of 0.05 mg kg-1 body weight.
Descriptors: camels, males and females,pharmacokinetics and pharmacodynamics of dexamethasone, intravenous dose, elimination half lives, total body clearances, gender differences, plasma cortisol, white cells analyses, urine analysis.

Dixit, SK; Tuteja, FC; Sena, DS; Singh, R; Sharma, N. **Miticidal properties of a herbal formulation on camel.** *Veterinary Practitioner.* 2004; 5(2): 114-116. ISSN: 0972-4036
Descriptors: dromedary camels, mite infestations, mite control, herbal medicines, medicinal plant, efficacy, medicinal properties of drug plants.

Lenin Bhatt; Anju Chahar; Tuteja, FC; Tanwar, RK; Deepak Verma. **Therapeutic efficacy of enrofloxacin alone and in combination with levamisole in subclinical mastitis in camel.** *Journal of Camel Practice and Research.* 2004; 11(2): 153-156. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A total of 100-quarter milk samples were collected from 25 lactating dromedary camels in sterilized test tubes and were subjected to culture tests, California mastitis test (CMT), somatic cell count (SCC), pH and electrical conductivity (EC) tests before treatment and then after the fourth day following the treatment course to study the therapeutic efficacy of enrofloxacin (5 mg/kg body weight once daily for 3 days) as systemic therapy alone and in combination with levamisole (2.5 mg/kg body weight once daily for 3 days) for the treatment of subclinical mastitis. It was shown that treatment with both enrofloxacin alone and in combination with levamisole was effective in controlling *Staphylococcus*, *Streptococcus*, *Bacillus* and *Corynebacterium*-induced subclinical mastitis in camels but the use of levamisole did not seem to significantly increase the therapeutic efficacy of enrofloxacin. Reproduced with permission of CAB.
Descriptors: dromedary camels, lactating camels, subclinical mastitis testing, somatic cell counts, bacterial pathogens, *Staphylococcus*, *Streptococcus*, *Bacillus*, *Corynebacterium*, treatment with antiobiotics, enrofloxacin, levamisole, multiple drug therapy, potency, efficacy of antiobiotic treatment.

Saleem, AN; Al Hadidi, MAF. **Efficacy of some drugs used in the treatment of naturally occurring mange in camels.** *Iraqi Journal of Veterinary Sciences.* 2004; 18(1): 49-62. ISSN: 1607-3894
Abstract: The efficacy of ivermectin, diazinon and cypermethrin in the control of sarcoptic mange in Arabian camels (*Camelus dromedaries*) was evaluated. The animals were divided into four group and were treated with: ivermectin 1% (0.2 mg/kg b.w.) s.c. (group I); two doses of ivermectin 1% given 7 days apart (group II); diazinon (60) (group III) and local cypermethrin (group IV). The animals were examined clinically for the types and distribution of mange and for the presence of other infections. Haematological and biochemical analyses were conducted on days 6, 14, 21 and 28 of the treatment. Skin scraping samples were examined for mite number and presence of their ova. Haematological examination included Hb, PCV, DLC and TLC while the biochemical analysis included determination of ALT, AST and TP. Clinical examination of the infected animals showed signs of itchiness, pruritus, restlessness, thickening and dryness of the affected areas and oozing of blood and serum, especially in severely affected areas. Skin lesions were distributed on the face, around the eyes, neck, upper parts of the limbs, trunk and tail. The lesions usually involved more than one area. The results revealed that group II camels showed the best response to treatment. Haematological and biochemical results revealed an improvement toward normal values post-treatment. In conclusion, this study shows greater efficacy of ivermectin in the treatment and control of mange in camels compared to diazinon and cypermethrin. Ivermectin can also be applied easily and has lower toxicity.
Descriptors: dromedary camels, mange, *Sarcoptes*, ectoparasites, blood chemistry, cypermethrin, diazinon, dosage effects, drug therapy, potency, hematology.

Van Gool, E; Sun, L; Alvinerie, M; Murray,M. **Pharmacokinetics of omeprazole in *Camelus dromedarius***. *Journal of Veterinary Internal Medicine.* 2004; 18(3): 460. ISSN: 0891-6640. Note: "22nd Annual American College of Veterinary Internal Medicine (ACVIM) Forum, Minneapolis, MN, USA; June 09-12, 2004."
Descriptors: dromedary camels, omeprazole, gastric secretion inhibitor drug, pharmacokinetics, oral administration.

Arabian: Parasites

2008

Abdally, MH. **Species of ticks on camels and their monthly population dynamics in Arar city, KSA.** *Assiut Veterinary Medical Journal*. 2008; 54(117): 302-309. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: A study was conducted to identify the species of ticks found in camels (*Camelus dromedarius*) and their seasonal population dynamics in Arar city, Saudi Arabia. Collection and identification of the ticks were undertaken from January 2006 to December 2006. On each occasion, all the visible adult ticks were collected from the body of each camel and the ground. The most abundant species of ticks on the camels at the study area were *Hyalomma* (96%) and *Amblyomma* (4.0%). The average tick load per camel was higher during rainy months (more than 30 ticks) than during dry months (less than 11 ticks). The study concluded that any strategy intended to mitigate problems of tick infestation of camels in this area should take into account the identified tick species and their seasonal abundance.

Descriptors: dromedarycamels, tick populations, *Amblyomma,Hyalomma,* disease prevalence, disease surveys, epidemiology, seasonal population fluctuations, seasonality, Saudi Arabia.

Barton, MA . **Nasal and gastro-intestinal parasites of the camel (*Camelus dromedarius*) from central Australia.** *Transactions of the Royal Society of South Australia.* 2008; 132(Part 1): 40-42. ISSN: 0372-1426

Descriptors: 289 dromedary camels, nasal bot fly, *Cephalopina titillator*, gastrointestinal nematode parasites, *Cooperia pectinata*, *Nematodirella dromedarii*, disease survey, levels of infection, Australia.

Oryan, A; Valinezhad, A; Moraveji, M. **Prevalence and pathology of camel nasal myiasis in eastern areas of Iran.** *Tropical Biomedicine.* 2008; 25(1): 30-36. ISSN: 0127-5720

Descriptors: 1328 dromedary camels, males, females, various ages, camel botfly larvae, seasonal variations, sex variations, *Cephalopina titillator,* post slaughter parasite survey, 58.1% infestation, nasal cavity, pharynx, turbinates, frontal sinuses, histopathological studies, clinical picture, Mashhad Slaughterhouse, Khorasan Razavi Province, eastern Iran.

Sajid , MS ; Zafar Iqbal; Khan, MN; Ghulam Muhammad. **Point prevalence of hard ticks (Ixodids) infesting domestic ruminants of lower Punjab, Pakistan.** *International Journal of Agriculture and Biology*. 2008; 10(3): 349-351. ISSN: 1560-8530

URL: http://www.fspublishers.org/

Abstract: The objective of this study was to determine the diversity and intensity of tick population infesting domestic ruminants in Districts Layyah and Muzaffargarh of lower Punjab (Pakistan). A total of 1050 cattle, 700 buffaloes, 1400 each of sheep and goats and 250 camels were randomly selected and examined for the prevalence of tick infestation. The highest (P=0.00) prevalence of tick infestation was found in cattle (n=789/1050; 75.1%) fol-

lowed in order by goat (n=723/1400; 51.6%) and buffaloes (n=281/700; 40.08%). None of the examined camels and sheep was found infested with ticks. *Hyalomma anatolicum* was the most abundant followed by *Rhipicephalus sanguineus*. Appropriate control measures for ticks need to be employed in the study area for economical animal production. Reproduced with permission of CAB.
Descriptors: sheep, cattle, dromedary camels, goats, buffalo, disease-prevalence, disease surveys, epidemiology, infestation, mixed infections, *Hyalomma anatolicum*, *Metastigmata*, *Rhipicephalus sanguineus*, disease surveillance, multiple infections, Pakistan.

Shakerian, A; Shekarforoush, SS; Rad, HG. **Prevalence of *Linguatula serrata* nymphs in one-humped camel (*Camelus dromedarius*) in Najaf-Abad, Iran.** *Research in Veterinary Science*. 2008 Apr; 84(2): 243-245. ISSN: 0034-5288
DOI: http://dx.doi.org/10.1016/j.rvsc.2007.04.015
NAL call no: 41.8 R312
Abstract: The prevalence of *Linguatula serrata* nymphs in livers and mesenteric lymph nodes (MLNs) of 400 camels of different sex and age groups was investigated. The lymph nodes and livers were examined macroscopically. A digestion method was also applied for investigation of liver samples. The MLNs in 84 camels out of 400 (21.0%) and the livers of 18 camels out of 400 (4.5%) were infected by *L. serrata* nymphs. The infection rate increased with age ($p < 0.01$). No significant difference was observed between the prevalence in males and females ($p > 0.1$). It is concluded that consumption of raw or under-cooked camel liver may result in nasopharyngeal linguatulosis in humans.
Descriptors: dromedaries, animal diseases, parasitoses, endoparasites, Arthropoda, disease prevalence, zoonoses, food pathogens, risk assessment, epidemiological studies, disease detection, slaughter, meat inspection, camel meat, lymph nodes, liver, pathogen identification, nymphs, histopathology, *Linguatula serrata*, *Pentastomida*, nasopharyngeal linguatulosis, Halzoun syndrome, Iran.

Zayed, AA; Abdel Shafy, S; El Khateeb, RM. **Surface ultrastructure of posterior abdominal spiracles of third instars of nasal bots of *Cephalopina titillator*, *Oestrus ovis* and *Rhinoestrus purpureus* (Diptera:Oestridae) infesting camels, sheep and donkeys in Egypt.** *Research Journal of Parasitology.* 2008; 3(1): 1-11. ISSN: 1816-4943
Abstract: Scanning electron microscope was used to describe the fine structure of posterior spiracles of third instars of *Cephalopina titillator*, *Oestrus ovis* and *Rhinoestrus purpureus*. The posterior spiracles was found to locate a hallow depressed cuticle of the posterior end of the larval body with an ecdysal scar. The cuticle surrounding the posterior spiracles was provided with spinules and sensory papillae of a taxonomic value. The spinules were numerous and irregularly distributed in dorsal and ventral rows in *C. titillator* and *O. ovis*. However, these spinules were few or absent in *R. purpureus*. The sensory papillae were of different shape; it long and cone-shape in *R. purpureus*, flat and button-shaped in *C. titillator* and reduced in *O. ovis*. The posterior spiracles consisted of two spiracular plates. Each plate appeared strongly sclerotized bearing numerous of respiratory units. The situation of spiracular plate together with ecdysal scar was also of a characteristic taxonomic value. The ecdysal scar surrounded by the spiracular plate either completely in *O. ovis* or partially in *R. purpureus* or never sur-

rounded by it in *C. titillator* but situated medially at the edge of the spiracular plate. The respiratory unit consisted of rima and respiratory slit which appeared a narrow as zigzag-like in *O. ovis*. This respiratory slit appeared linear not zigzag with a few trabecular tissues in *C. titillator*. However, this slit was covered with a cap-like structure in *R. purpureus*. It was concluded that the posterior spiracles of nasal bots have a characteristic line structures of taxonomic value, which may be used for differentiation of these larval species. Reproduced with permission of CAB.

Descriptors: camels, asses, donkeys, sheep, nasal bots, infestation, larvae, *Cephalopina titillator*, *Oestrus ovis*, *Rhinoestrus purpureus*, morphology, scanning electron microscopy, spiracles, ultrastructure, Egypt.

2007

Chhabra , MB ; Khurana, KL. **Parasitisms of camels revisited: 3 - Ectoparasites.** *Journal of Camel Practice and Research.* 2007; 14(1): 1-8. ISSN: 0971-6777. Note: A literature review.

URL: http://www.camelsandcamelids.com

Abstract: Ectoparasites of camels and the injury and diseases associated with them are more prevalent and more serious than is commonly realized. Through widespread distress and morbidity, and through their role as vectors of disease, they impact the economy of camel-rearing in diverse ways. Sarcoptic mange is a serious debilitating and dreaded disease throughout the camel world. It is known to predispose affected camels to other infections and is a good measure of herd health. Camel ticks, notably *Hyalomma dromedarii*, characteristically cause heavy infestations. Acaricidal control agents presently in use are not wholly satisfactory. Biting flies transmit the most important disease of surra apart from being a serious menace due to their blood sucking and annoyance. Myiasis-causing flies are widespread and readily infect wounds. The larvae of camel nasal bot *Cephalopina titillator* are highly prevalent obligatory parasites which can undermine the well-being of animals. The recent literature on these entities are reviewed with the objective to focus attention and to stimulate enhanced reportage. The need to evolve camel-specific control strategies is also discussed.

Descriptors: dromedarycamels, ectoparasites, disease vectors, vector control, camel diseases, disease control; disease prevalence, disease transmission, epidemiology, *Cephalopina titillator*, Diptera, *Hyalomma dromedarii*, Metastigmata, *Sarcoptes scabiei*, *Trypanosoma evansi*.

Ebrahimi, A; Montazeri, B; Lotfalian, S. **Dermatophytes isolated from the hair coat/skin scrapping of healthy dromedaries in Iran.** *Journal of Camel Practice and Research.* 2007; 14(2): 133-134. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The incidence of dermatophytes in 143 hair coat/skin scraping samples of camels (*Camelus dromedarius*) from Najafabad slaughter house in Iran was determined [date not given]. Twenty-five isolates (17.48%) were *Trichophyton* spp. and 1 (0.7%) was *Microsporum nanum.* The most common species of *Trichophyton* were *T. mentagrophytes* (14, 9.8%), *T. verrucosum* (5, 3.5%), *T. schoenleinii* (3, 2.1%) and *T. tonsurans* (3, 2.1%). Camels should therefore be included in the category of asymptomatic carriers of zoonotic dermatophytes. Reproduced with permission of CAB.

Descriptors: dromedary camels, dermatophytes, skin fungi, disease prevalence, disease surveys, epidemiological surveys, epidemiology, mycoses, skin diseases, skin lesions, zoonoses, zoonotic skin infections *Microsporum nanum*, *Trichophyton mentagrophytes*, *Trichophyton schoenleinii*, *Trichophyton tonsurans*, *Trichophyton verrucosum,* Iran.

Gahlot, TK (Editor). ***Proceedings of the International Camel Conference "Recent trends in Camelids research and Future strategies for saving Camels", Rajasthan, India, 16-17 February 2007.*** published by Rajasthan, India: College of Veterinary & Animal Science. 2007; iii + 226 pp.

Abstract: A total of 78 papers presented at the International Camel Conference are included in this supplement. The topics discussed include disease diagnosis and treatment, breeding and genetics, immunology, microbiology, reproduction, ethnoveterinary practice, camel husbandry, management practices, nutrition, surgery, anatomy, physiology, pharmacology, milk, draft power, production and parasitology. Reproduced with permission of CAB.

Descriptors: Bactrian camels, dromedary camels, camel milk, anatomy, breeding camel diseases, camel husbandry, nutrition, physiology, bacterial diseases, diagnosis, draft animals, genetics, immunology, parasitology, parasitoses, pharmacology, therapeutics, viral infections, reproduction, surgery, therapy, veterinary practice, viral diseases, working animals.

Khosravi, AR; Shokri, H; Niasari Naslaji, A. **An outbreak of a mixed infection of *Trichophyton verrucosum* and *Nocardia asteroides* in dromedary camel in Iran.** *Journal of Camel Practice and Research.* 2007; 14(2): 109-112. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: This study presents an outbreak of a mixed infection of dermatophytosis and nocardiosis in a herd of 100 dromedary camels in Iran during summer 2007. A total of 74 out of 100 camels were affected (74%). The camels showed crusty and hairless patches, ulcerative nodules and microabscesses especially on the neck, shoulders, flanks, and the upper parts of the limbs. Young camels demonstrated a relatively greater amount of skin lesions. The skin samples were analysed by direct microscopy, culture and histopathology. The results showed the presence of hyphal forms and numerous amounts of large arthroconidia (5-8 micro m) as well as Gram-positive filaments with a diameter of 1 micro m in skin samples. *Nocardia asteroides* and *Trichophyton verrucosum* were isolated from skin lesions. In addition, a marked response to treatment with natamycine and trimethoprim and sulfamethoxazole agents was observed. Reproduced with permission of CAB.

Descriptors: dromedary camels, clinical-aspects, dermatomycoses, diagnosis, disease control, drug therapy, histopathology, mixed infections, natamycin, nocardiosis, outbreaks, skin lesions, sulfamethoxazole, trimethoprim, pimaricin, *Nocardia asteroids*, *Trichophyton verrucosum*, multiple infections, Iran.

Lawal, MD; Ameh, IG; Ahmed, A. **Some ectoparasites of *Camelus dromedarius* in Sokoto, Nigeria.** *Journal of Entomology.* 2007; 4(2): 143-148. ISSN: 1812-5670

URL: http://scialert.net/jindex.php?issn=1812-5670

Abstract: Camels (*Camelus dromedarius*) at Sokoto abattoir livestock market were physically screened at random, for ectoparasites by macroscopic observation, grooming and scrapping

of 3960 anatomical sites on 396 animals. 367 (92.7%) of the 396 camels were infested vis-a-vis 335 (91.28%) by ticks, 17 (4.63%) by flies, 13 (3.54%) by mites and 2 (0.55%) by lice. The ectoparasites identified and their relative abundance on the camels was as follows: *Hyalomma* sp. (48.0%), *Amblyomma* sp. (16.79%), *Boophilus* sp. (14.91%), *Rhipicephalus* sp. (14.71%), *Musca domestica* (2.48%), *Hippobosca camelina* (2.13%), *Sarcoptes scabiei* var *cameli* (0.44%), *Haematopinus tuberculatus* (0.27%), *Tabanus longicorins* (0.27%). *Hyalomma* species, which was the most prevalent species of the ectoparasites, was identified as *H. dromedarii* (46.9%), *H. rufipes* (22.9%), *H. impeltatum* (18.5%) and *H. truncatum* (11.7%). These ectoparasite fauna may have been imported across the border by traffics of camel caravan, which linked Sokoto and other sahelian countries. Although the impact of these parasites on host animals and the environment was not measured in this study, it was however, concluded that the number and species of infesting ectoparasites encountered were significant enough to pose a potential public health hazard, especially tick pestilence.
Descriptors: dromedary camels, ectoparasites, *Amblyomma*, Diptera, *Haematopinus tuberculatus*, *Hippobosca camelina*, *Hyalomma dromedarii*, *Hyalomma impeltatum*, *Hyalomma marginatum rufipes*, *Hyalomma truncatum*, *Metastigmata*, mites, *Musca domestica,Phthiraptera, Rhipicephalus*, *Sarcoptes scabiei*, *Tabanus*, *Boophilus*, *Tabanus longicorins*, Nigeria.

Mazyad, SAM; Hafez, AO. **Q fever (*Coxiella burnetii*) among man and farm animals in North Sinai, Egypt.** *Journal of the Egyptian Society of Parasitology.* 2007; 37(1): 135-142. ISSN: 1110-0583
Abstract: Antibodies against *Coxiella burnetii* were estimated among sheep, goats and camels (190), their owners (150 patients with pyrexia of unknown origin) and 30 normal individuals in North Sinai, Egypt during 2006 by indirect immunofluorescence assay. Nested polymerase chain reaction was used to detect Com-1 gene (genetic target of *C. burnetii*) encoding a 27 kDa outer membrane protein in the samples. *C. burnetii* IFA antibodies (IgM and IgG) in patients were 8 (5.3%) and a healthy control (3.3%). The overall was 9 of 180 (5.0%). *C. burnetii* IgM were detected in 3/150 (2%) patients with positive genome, while IgG were detected in 5/150 patients, only the 3 who had IgM and IgG had positive genome suffered high fever. *C. burnetii* antibodies were detected in 20 (22.5%), 12 (16.8%) and 4 (13.3%) of sheep, goats and camels, which totalled 36/190 (18.9%). The positive genome of these IFA positive animals was 10 (50.0%), 4 (33.3%) and zero (0.0%), respectively. On the other hand, *Rhipicephalus sanguineus* (dog tick) and *Dermacentor andersoni* (wood tick) were identified on some Q fever infected animals. Reproduced with permission of CAB.
Descriptors: camels, goats, humans, sheep, abattoir fever, Balkan grippe, Derrick Burnet disease, Nine Mile fever, PCR, pneumorickettsiosis, pyrexia, quadrilateral fever, query fever, antibodies, fever, genes, genotypes, human diseases, IgG, IgM, immunoassay, Q fever, *Coxiella burnetii,Dermacentor andersoni*, *Rhipicephalus sanguineus*, Egypt.

Mazyad, Said AM; Hafez, Adel Omar. **Q fever (*Coxlella burnetii*) among man and farm animals in North Sinai, Egypt**. *Journal of the Egyptian Society of Parasitology.* 2007; 37(1): 135-142. ISSN: 1110-0583
Descriptors: sheep, goats, camels, humans, zoonotic pathogen, pyrexia, *Coxiella burnetii*, antibody testing for Q fever, nested PCR, Com-1gene encoding 27-kDA membrane protein,

IFA antibodies, *Rhipicephalus sanguineus* (dog tick), *Dermacentor andersoni* (wood tick) on some Q fever infected animals, Sinai, Egypt.

Pal, M; Patil, DB; Kelawala, NH; Parikh, PV; Barvalia, DR; Patel, DM. **Occurrence of fungal otitis in camels.** *Journal of Camel Practice and Research.* 2007; 14(1): 73-74. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camels, case reports, clinical aspects, diagnosis ear infection, mycoses, otitis, *Aspergillus flavipes*, *Candida albicans,* Gujarat, India.

Pourjafar, M; Azizi, H; Darabi, S; Khosravi, M. **The prevalence of nymphal stage of *Linguatula serrata* in camels (*Camelus dromedarius*) in Najafabad, Iran.** *Journal of Camel Practice and Research.* 2007; 14(2): 171-173. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The prevalence rate of *Linguatula serrata* nymphs in livers and mesenteric lymph nodes (MLNs) of 200 camels was investigated. Samples of lymph nodes and livers were examined macroscopically. MLNs of 70 camels (35%) and livers of 23 camels (11.5%) were infected with L. serrata nymphs. There was no significant difference between the prevalence in livers and MLNs among different age groups.
Descriptors: dromedary camels, liver, lymph nodes, nymphs, *Linguatula serrata,* diagnosis, disease surveillance, disease prevalence, disease surveys, epidemiology, Iran.

Shoker, NI; Zahran, WM; Mohammed, AS. **Present status of ixodid ticks parasitizing some domestic animals in El Minia Governorate.** *Journal of the Egyptian German Society of Zoology.* 2007 January; 52(D): 35-56. Note: In English with an Arabic and English summary.
Abstract: A one year (July, 2001 - June, 2002) tick fauna study of some domestic animals. Ixodid ticks were collected from cows, buffaloes, camels and dogs. Cows were most healily infested. Four species of ixodid ticks, belonging to three genera were identified: *Boophilus annulatus*, *Hyalomma excavatum*, *H. dromedarii* and *Rhipecephalus sanguineus*. *Boophilus annulatus* was the most common and most abundant one. It along with *Hyalomma excavatum* preferred cows as the host. *Hyalomma dromedarii* exclusively parasitized camels. *Rhipecephalus sanguineus* mainly fed on dogs. The tick species showed preferences for particular sites on the hosts' body. These preferences could vary according to the host species. *Boophilus annulatus* was frequently detected throughout the study period, showing moderate and close levels of seasonal activity, except for an extremely high one that was markedly observed towards the end of spring. *Hyalomma excavatum* was infrequently detected throughout the study period, but it mainly appeared during spring and autumn. *H. dromedarii* and *Rhipecephalus sanguineus* was mosly collected during spring and summer. Some discussion of control measures is presented.
Descriptors: cattle, dogs, buffaloes, camels, ixodid ticks, *Boophilus annulatus*, *Hyalomma dromedarii*, *Hyalomma excavatum*, *Rhipicephalus sanguineus*, mammalian hosts, prevalence on domestic hosts, El Minia, Egypt.

Tajik, H; Tavassoli, M; Khani, H; Javadi, S. **Prevalence of *Linguatula serrata* nymphs in slaughtered camels of Iran.** *Journal of Camel Practice and Research.* 2007; 14(1): 69-71. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: One-hundred-and-thirty-eight slaughtered camels were investigated for *Linguatula serrata* infection in Iran during September 2005-March 2006. Samples from the lungs, mesenteric lymph nodes and livers were examined macroscopically and liver samples were studied by digestion method. It was shown that mesenteric lymph nodes of 103 camels (75%), lungs of 41 (29.7%) and livers of 42 (30.4%) camels were infected with *L. serrata* nymphs. 55 out of 75 females (73.3%) and 48 out of 63 males (76.2%) were found to be positive to *L. serrata*. High rate of infection in mesenteric lymph nodes of the camels indicate careful inspection of carcasses to detect *L. serrata* infection. The maximum and minimum numbers of parasites in lymph nodes were 46 and 1, respectively. Infection of the offal of camels underlines the zoonotic importance of the disease, whereas consumption of raw or undercooked camel livers is not unusual in some places of Iran. Reproduced with permission of CAB.

Descriptors: dromedary camels, disease prevalence, disease surveys, epidemiological surveys, epidemiology, *Linguatula serrata*, nymphs, food safety, liver, lungs, parasitoses, zoonotic parasite, Iran.

2006

Amin, MM; Youssef, RR; El Naggar, AL; Mahmoud, MA; El Kattan, A. **Some studies on skin affections among local and imported camels in Halaieb, Shalateen and Abou-Ramad areas.** *Veterinary Medical Journal Giza.* 2006; 54(3): 691-700. ISSN: 1110-1423. Note: In English with an Arabic summary.

Abstract: A total of 47 skin scrapings from 27 local and 20 imported dromedary camels showing skin lesions were collected during summer (32) and winter (15) from September 2003 to August 2004, and prepared and examined microscopically for the presence of mange and or ringworm infection. The overall prevalence rates of mange were 14.81 and 30% for local and imported camels and 18.75 and 26.66% in summer and winter seasons, respectively. *Sarcoptes scabiei* var. *cameli* was the only identified mite species. Ringworm infection rate was 14.81 and 12.5% in local camels in summer and winter, respectively. No cases of ringworm were observed in imported camels. Clinical examination of 185 local and 76 imported camels revealed that the overall prevalence rate of tick infestation was 44.86% in local camels and 57.89% in imported camels. Tick infestation peaked during summer (62.29%), followed by winter (55.17%), then lower rates were recorded during autumn (46.26%) and spring (34.66%). Only 2 species of ticks were identified. *Hyalomma dromedarii* was the most prevalent (81%) and was usually found on the camel's body, while the *Ornithodoros savignyi* was recorded in a few cases (19%) and was usually found in the camel resting places.

Descriptors: dromedary camels, skin diseases, ectoparasites, *Hyalomma dromedarii,Meta stigmata,Ornithodoros savignyi*, *Sarcoptes scabiei*, dermatomycoses, mange, scabies, disease prevalence, disease surveys, ectoparasites, ectoparasitoses, seasonal variation, epidemiological surveys, epidemiology, seasonality, spring, summer, winter, autumn, Egypt.

Dia, ML **Parasites of the camel in Burkina Faso.** *Tropical Animal Health and Production.* 2006; 38(1): 17-21. ISSN: 0049-4747
DOI: http://dx.doi.org/10.1007/s11250-006-4303-x
NAL call no : SF601.T7
Abstract: A survey was conducted to determine the prevalence of parasitoses in dromedaries in Burkina Faso. Blood and faecal samples from animals of different ages and both sexes were collected from different villages in Oudalan in April 2004. It was shown that the parasitological and serological prevalences of *Trypanosoma evansi* were 18 and 46%, respectively. *T. brucei* was also detected. Most of the trypanosome-infected animals were from Garagara (37%), Markoye (30%) and Touro villages (11%), with seroprevalences of 81, 50 and 33%, respectively. None of the camels in Esakane had trypanosomes. 15 out of 38 faecal samples were positive for strongyle eggs, with higher rates in Markoye and Esakane. Eggs per g faeces (epg) varied from 0-800 and was highest in Markoye. One animal was positive for *Moniezia* spp. *Hyalomma dromedarii*, *H. marginatum rufipes*, *H. impressum*, *H. truncatum* and *H. impeltatum* were the most commonly isolated ticks in the camels. Alopecia and pruritus in many animals were caused by *Sarcoptes scabiei* var. *cameli*. Reproduced with permission of CAB.
Descriptors: dromedary camels, disease prevalence, disease surveys, epidemiological surveys, epidemiology, geographical variation, parasites, parasitoses, serological surveys, seroprevalence, *Trypanosoma evansi, Moniezia* spp. *Hyalomma dromedarii* , *Hyalomma marginatum rufipes*, *Hylomma impressum*, *Hyalomma truncatum*, *Hyalomma impeltatum,* mange, *Sarcoptes scabiei* var. *cameli*, Burkina Faso.

Dixit, SK; Singh, AP; Tuteja, FC; Sena, DS; Sharma, N. **Frequency rescheduling of a herbal formulation against mange in dromedary camels.** *Veterinary Practitioner*. 2006; 7(1): 76-79. ISSN: 0972-4036
Abstract: In the development of herbal drug formulations against *Sarcoptes* infection in dromedary camels, one of the two developed formulations, F1, was studied on naturally occurring clinical cases to restandardize the dose schedule and frequency of the formulation while maintaining its efficacy. A total of 5-7 applications were found to be sufficient in curing the disease. Results were comparable to daily and alternate applications followed by 5th day. A combination of daily application for the first three days and then on alternate days for the remaining days is the best approach to manage the disease successfully. Reproduced with permission of CAB.
Descriptors dromedary camels, *Sarcoptes* mange, disease control, herbal medicines, dosage effects, drug delivery.

Ghoke, S; Jadhav, KM; Pal, M. **Dermatophytosis in Indian dromedary (*Camelus dromedarius)* caused by *Trichophyton verrucosum.*** *Journal of Camel Practice and Research.* 2006; 13(1): 59-60. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The prevalence of dermatophytosis was studied in Indian dromedary (*Camelus dromedarius)* belonging to an organized farm located in Kutch area of Gujarat. 18 camels of both sexes and different age groups showing skin lesions on several body sites were investigated mycologically by employing direct microscopy and cultural isolation techniques. Only 2 camels showed the presence of *Trichophyton verrucosum* in the cutaneous lesions. No epide-

miological investigation was conducted to establish the source of infection. It was suggested that *T. verrucosum* infection should be considered in the differential diagnosis of dermatitis. Reproduced with permission of CAB.
Descriptors: dromedary camels, clinical aspects, dermatitis, dermatomycoses, diagnosis, differential diagnosis, disease prevalence, skin lesions, *Trichophyton verrucosum*, Gujarat, India.

Gorakh Mal; Sena, DS; Sahani, MS. **Haemato-biochemical changes in camels infested with mange during winter and summer season.** *Journal of Camel Practice and Research* . 2006; 13(2): 173-174. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The present work aimed to study the haemato-biochemical alteration in mange-infested camels in India compared to healthy camels during winter and summer seasons. There were significant (P<0.01) decreases in haemoglobin (Hb) and neutrophils, while significant increases in eosinophils, lymphocytes, aspartate aminotransferase (AST), alanine aminotransferase (ALT), triglycerides, urea and glucose were seen in mange infected camels during the winter season. During the summer season, a decrease in albumin content and an increase in total leukocyte counts (TLC), eosinophils, monocytes, AST, ALT, triglycerides and urea were observed. This study indicates that winter is the most conducive for spread of mange infection, and treatment during this period should be supplemented with supportive therapy along with acaricides.
Descriptors: dromedary camels, mange infested, blood and biochemical changes with disease, etiology, hematology, alanine aminotransferase, aspartate aminotransferase, glutamate-pyruvate transaminase, blood chemistry, blood sugar, clinical aspects, white blood cell counts, neutrophils, eosinophils, leukocyte count, lymphocytes, monocytes, nitrogen, seasonal variation, seasonality, serum albumin, triacylglycerols, winter, summer, India.

Gorakh Mal; Sena, DS; Sahani, MS. **Haemato-biochemical changes in camels infested with mange during winter and summer season.** *Journal of Camel Practice and Research* . 2006; 13(2): 173-174. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The present work aimed to study the haemato-biochemical alteration in mange-infested camels in India compared to healthy camels during winter and summer seasons. There were significant (P<0.01) decreases in haemoglobin (Hb) and neutrophils, while significant increases in eosinophils, lymphocytes, aspartate aminotransferase (AST), alanine aminotransferase (ALT), triglycerides, urea and glucose were seen in mange infected camels during the winter season. During the summer season, a decrease in albumin content and an increase in total leukocyte counts (TLC), eosinophils, monocytes, AST, ALT, triglycerides and urea were observed. This study indicates that winter is the most conducive for spread of mange infection, and treatment during this period should be supplemented with supportive therapy along with acaricides.
Descriptors: dromedary camels, mange infested, blood and biochemical changes with disease, etiology, hematology, alanine aminotransferase, aspartate aminotransferase, glutamate-pyruvate transaminase, blood chemistry, blood sugar, clinical aspects, white blood cell counts, neutrophils, eosinophils, leukocyte count, lymphocytes, monocytes, nitrogen, seasonal variation, seasonality, serum albumin, triacylglycerols, winter, summer, India.

Radfar, MH; Maimand, AE; Sharify, A. **A report on parasitic infections in camel (*Camelus dromedarius*) of Kerman slaughterhouse.** *Journal of the Faculty of Veterinary Medicine, University of Tehran.* 2006; 61(2): 165-168. ISSN: 1022-646X. Note: In Persian with an English summary.

Abstract: This study was conducted to determine the prevalence of parasitic infections in camels (*Camelus dromedarius;* n=60) from the Kerman slaughterhouse. The examination of different organs (including alimentary canal, abdominal cavity, liver, lung, kidneys, heart) and blood smear for parasitic infections were done. The parasites in the washed contents of alimentary canal, lung and sliced organ were cleared using lactophenol or stained with carmine acid collected, counted and identified under the microscope. Blood smears were stained with Giemsa stain. Parasites were found on the alimentary tract, liver, lung, nasal cavity and blood of the camels. Eight species of parasites were detected in abomasum (*Haemonchus contortus*; 6.67%), small intestine (*Moniezia expansa,* 5%; *M. benedeni,* 6.67%; *Stilesia globipunctata*, 8.3%), liver (hydatid cyst, 3.3%), lungs (hydatid cyst, 28%; *Dictyocaulus filaria*, 10%), nasal cavity (*Cephalopina titillator* larvae, 63.3%), and blood (*Trypanosoma evansi*, 1.6%). This is the first report of these parasites in camels from Kerman. Reproduced with permission of CAB.

Descriptors: dromedary camels, post slaughter sampling, diseases, abdominal cavity, disease prevalence, epidemiology, hydatids, heart, kidneys, liver, lungs, small intestine, gastrointestinal tract, nasal cavity, *Cephalopina titillator*, *Dictyocaulus filarial*, *Haemonchus contortus*, *Moniezia benedeni*, *Moniezia expansa,Stilesia globipunctata*, *Trypanosoma evansi*, *Secernentea*, *Strongylida*, Kerman.

2005

Abo Shehada, MN. **Incidence of screw-worm myiasis in Saudi Arabia, 1999/2000.** *Veterinary Record.* 2005; 156(11): 354-356. ISSN: 0042-4900

URL: http://veterinaryrecord.bvapublications.com

NAL call no: 41.8 V641

Abstract: Cutaneous myiasis cases were surveyed in farm animals in Saudi Arabia from September 1999 to August 2000. Veterinarians conducted monthly inspections on livestock farms, markets and the zoo in Jeddah. Larvae collected from myiasis cases were identified. It was shown that *C. bezziana* was prevalent in the Eastern Province, Riyadh and Qasseim governorates, which have a substantial concentration of agricultural production. No evidence of myiasis was found in other areas of the country. The majority of cases occurred in sheep (42%), followed by goats (37%), cattle (14%), horses (4%) and camels (3%). A single case was diagnosed in a donkey. *Wohlfahrtia nuba*, *W. magnifica,Lucilia cuprina*, *L. sericata* and C. *albiceps* were also found. These results confirm that *C. bezziana* is the main cause of myiasis in Saudi Arabia and has an economic impact on livestock production.

Descriptors: camels, cattle, sheep, donkeys, goats, horses, *Chrysomya bezziana, Chrysomya albiceps,* screw worm larvae, survey of livestock, myisais, disease prevalence, disease surveys, epidemiological-surveys; epidemiology, *Lucilia cuprina*, *Lucilia sericata*, *Wohlfahrtia*, *Wohlfahrtia magnifica*, *Wohlfahrtia nuba*, Saudi Arabia.

Al Ani, FK; Roberson, J. **Fungal infection of camelids.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 70-84. ISBN: 1586034731

Descriptors: camelids, Bactrian camels, dromedary camels, fungal infections, clinical aspects, etiology, aflatoxicosis, aflatoxin poisoning, European blastomycosis, aspergillosis, candidosis, candidiasis, cryptococcosis, dermatomycoses, ergotism, lymphangitis, mycoses, mycotoxicoses, mycotoxins, fungal toxins, dermatophytes, sporotrichosis, zygomycosis, fungal morphology, diagnosis diagnostic techniques, disease control, disease prevention, drug therapy, epidemiology, defence mechanisms, geographical distribution, histopathology, natural immunity, pathogenesis, pathogenicity, taxonomy, antifungal agents, iodine, ceratocide, amphotericin B; antifungal agents; azoles, griseofulvin, imidazoles, nystatin, causal-agents *Ajellomyces capsulatus*, *Aspergillus,Candida albicans*, *Claviceps purpurea*, *Conidiobolus coronatus*, *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Microsporum*, *Neotyphodium coenophialum*, *Neotyphodium lolii*, *Rhizopus*, *Sporothrix schenckii*, *Trichophyton*, *Acremonium coenophialum*, *Acremonium lolii, Hyphomycetes.*

Al Talafha, HA; Amr, ZS; Al Sheyab, F. **Seasonal abundance of horseflies (Diptera: Tabanidae) in Suwaymah (Dead Sea area), Jordan.** *Journal of the Entomological Research Society.* 2005; 7(3): 39-46. ISSN: 1302-0250

URL: http://www.entomol.gazi.edu.tr

Abstract: The seasonal abundance and species richness of horseflies in Suwaymah, Jordan, were studied over a period of one year (January-December 2002). 12 species were collected from the study area. By frequency of captured individuals, *Tabanus albifacies* constituted 26.4% of the total collected specimens, followed by *T. sufis* (20.9%), *T. leleani* (17.8%), *T. pallidipes* (12.6%), *T. accensus* (10.4%), *T. rupinae* (4.1%), *Atylotus farinosus* (2.6%), *T. laetetinctus* (1.9%), *A. pulchellus* (1.5%), *Chrysops flavipes* (0.7%), *T. autumnalis* (0.7%) and *Haematopota minuscula* (0.4%). *T. leleani* and *T. sufis* were the first species to appear during the season. The number of recovered species started to increase in April and then decreased in October. Horseflies were absent in January, February, November and December. By host, horses were the preferred animals (12 species), followed by camels (10 species) and cows (7 species). Disease transmission and seasonal abundance are discussed.

Descriptors: cattle, dromedary camels, horses, cows, horseflies, disease transmission, disease vectors, blood sucking insects, hematophagous insects, host specificity, seasonal abundance, species richness, *Tabanus*, *Tabanus autumnalis*, *Atylotus farinosus*, *Atylotus pulchellus*, *Chrysops flavipes*, *Haematopota minuscula*; *Tabanus accensus*, *Tabanus albifacies*, *Tabanus laetetinctus, Tabanus leleani*, *Tabanus pallidipes*, *Tabanus rupinae*, *Tabanus sufis*, Jordan.

Basu, A K; Mohammed, A; Basu, M. **A note on camel nasal larva, *Cephalopsis titillator* (Clark, 1816), in Borno, State of Nigeria.** *Journal of Natural History India.* 2005; 1(1): 17-21. ISSN: 0973-6166

Abstract: A total of 250 carcasses of adult camels consisting of 174 males and 76 females were examined for the nasal parasite and 229 of these were found infected with the larvae which were identified as *Cephalopsis titillator* [Clark, 1816]. The morphology and life cycle of the parasite were studied.

Descriptors: dromedary camel, males, females, post slaughter survey, camel nasal larvae,

Cephalopina titillator, parasite infection levels, parasite life cycle, morphology, myiasis, Nigeria.

Dioli, M; Fox, MT. **First record of the camel tick *Rhipicephalus muhsamae* in Kenya on a one-humped camel (*Camelus dromedarius*).** *Veterinary Record*. 2004; 155(7): 206-208. ISSN: 0042-4900
URL: http://veterinaryrecord.bvapublications.com
NAL call no: 41.8 V641
Abstract: A total of 28 804 ticks were collected from different body regions of dromedaries in Laikipia District, Kenya, during the wet (May 1999 and June 2000) and dry seasons (September-October 1999). The specimens were identified as *Rhipicephalus simus*, *R. praetextatus* and *R. muhsamae*. Morphological differences in the genital aperture of female ticks observed by scanning electron microscopy led to the identification of R. muhsamae. This is the first report of *R. muhsamae* infesting in a dromedary in Kenya. Reproduced with permission of CAB.
Descriptors: dromedary camels, ectoparasites survey, ectoparasitoses, *Rhipicephalus muhsamae*, *Rhipicephalus simus*, *Rhipicephalus praetextatus*, geographical distribution, hosts, morphology, new geographic records, new host records, Kenya.

Dixit, SK; Singh, AP; Tuteja, FC; Sena, DS. **Use of herbal formulation in the cure of sarcopticosis in dromedary camel.** *Veterinary Practitioner.* 2005; 6(2): 185-190. ISSN: 0972-4036
Abstract: The efficacy of a herbal formulation prepared from local ingredients against Sarcoptes spp. was tested on dromedaries. 18 animals were divided into 3 groups which were treated with the formulation once daily (Group I), alternately + 15 ml levamisole hydrochloride subcutaneously (Ranbaxy, Group II) and no treatment (Group III). Skin scrapings, haematological and biochemical parameters were evaluated in all groups. Clinical symptoms (bleeding and skin cracks) significantly improved after 3 days of treatment in Group I. Itching, thickening and wrinkling of the skin persisted until day 10 but was reduced in intensity by day 15. Group II presented a much faster recovery by day 10, while clinical signs became more severe in Group III. Skin scrapings were also negative for mites on day 10 posttreatment. There were no significant changes in the haematological and biochemical parameters.
Descriptors: dromedary camels, mites, *Sarcoptes*, ectoparasitoses, skin lesions, clinical aspects, herbal drug formulations drug therapy, levamisole, medicinal plants; potency, traditional medicine chemotherapy, clinical picture, folk medicine, officinal plants.

El Bassiony, GM; Al Sagair, OA; El Daly, ES; El Nady, AM. **Alterations in the pituitary-thyroid axis in the camel *Camelus dromedarius* infected by larvae of nasal bot fly *Cephalopina titillator*.** *Journal of Animal and Veterinary Advances.* 2005; 4(3): 345-348. ISSN: 1680-5593
Abstract: The present study used Chemiluminescent Microparticle Immunoassay (CMIA) to examine the alterations of the pituitary-thyroid function in camels infected with third instar larvae of *Cephalopina titillator* by measuring the levels of triiodothyronine (T3) and thyroxine (T4) of the thyroid gland and level of thyroid stimulating hormone (TSH) of the pituitary gland. The results indicated that the infection of camels by larvae of the nasal bot fly caused hypothyroidism. This was indicated by the decrease in T3 and T4 blood levels. Also, the data obtained point to the occurrence of a parallel decrease in the level of blood TSH.

It appeared that the low release of TSH during infection with C. titillator together with the subsequent decline in T3 and T4 levels from thyroid gland, might reflect the direct effect of infection on pituitary gland, and suggest decreased synthesis of T3 and T4 in response to larval infection of nasal bot fly. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Cephalopina titillator*, nasal bot fly, effects on pituitary gland, effects on thyroid, blood chemistry, disease markers, hormonal control, hormone secretion, hypothyroidism, pituitary, thyroid diseases, thyroid gland, thyroxine, thyroid gland, triiodothyronine, endocrine control, endocrine secretion, hormonal regulation, hypophysis, liothyronine, thyroid stimulating hormone.

Ghulam Muhammad; Khan, MZ; Hussain, MH; Zafar Iqbal; Muhammad Iqbal; Muhammad Athar. **Ethnoveterinary practices of owners of pneumatic-cart pulling camels in Faisalabad City (Pakistan).** *Journal of Ethnopharmacology.* 2005; 97(2): 241-246. ISSN: 0378-8741
Abstract: The present study was planned to investigate the ethnoveterinary methods practiced by the owners of pneumatic-cart pulling camels in Faisalabad Metropolis (Pakistan). During a 7-year-period (November 1992-November 1999), 200 owners of draught camels working in the city were interviewed. Information concerning the ethnoveterinary practices for the treatment of common disorders of digestive tract (indigestion, colic and diarrhea), respiratory tract (cold/rhinitis, pneumonia), skin problems (mange, ulceration of nostrils with or without nasal myiasis, ticks and lice, harness sores), systemic states (fever, anhidrosis) and preventive therapy of indigestion and halitosis was collected through interviews and collated with those documented for the treatment of desert-dwelling camels. Familiarity of owners with two traditional methods of surra (trypanosomiasis) diagnosis ('Sand-ball test' and 'Hair-stick test') known to pastorilists was also probed. In addition, the dose and frequency of use of common salt was investigated. Traditional inputs utilized by the camel owners included various plant products, insecticides, sulphur, sump oil, common salt, aspirin, naphthalene balls and milk fat. Different owners used different combinations of traditional drugs for the treatment of disorders/conditions investigated. None of the camel owners was found familiar with the 'Sand-ball test' or 'Hair-stick test' of trypanosomiasis diagnosis. For the prevention of indigestion and halitosis all camel owners had practiced administration of 'massaulas' (physic drench/balls) along with common salt (average 250 g) on weekly basis. In general, the ethnoveterinary treatment practices used by the owners of city-dwelling camels appear to be different from those documented for the treatment of diseases of desert-dwelling camels.
Descriptors: draft camels in an urban environment, cart pulling camels, working camels, camel diseases, colic, diarrhea, dyspepsia, mange, parasitoses, parasitic infections, pneumonia, respiratory diseases, rhinitis, skin diseases, harness sores, injuries, *Trypanosoma evansi*, trypanosomiasis, myiasis, causal agents, diagnosis, disease prevention, ethnicity folk medicine, traditional medicine, ethnic differences, medicinal plants, plant extracts, aspirin, acetylsalicylic acid, insecticides, milk fat, naphthalene, plant extracts, ethnoveterinary care, salt, elemental sulfur, surveys, Pakistan.

Hassan, HY; Zaghawa, AAE; Fukata, T. **Treatment trial of one humped-camels (*Camelus dromedarius*) with mange using *Aloe vera* gel leaves.** *Japanese Journal of Zoo and Wildlife Medicine.* 2005; 10(2): 103-106. ISSN: 1342-6133. Note: In English with a Japanese

summary.

Abstract: Ten one-humped camels (*Camelus dromedarius*) suffering from mange were used in this investigation. The clinical signs of the affected animals were debility, various degrees of alopecia, severe dermatitis, pruritus and thickening with scales of different areas of the skin. All camels were treated for mange caused by *Sarcoptes scabiei* var. *cameli* by rubbing Aloe vera gel leaves topically on the affected skin lesions everyday. All skin lesions disappeared rapidly and unexpectedly, with the disappearance of mites in skin scrapings. Reproduced with permission of CAB.

Descriptors: dromedary camels, mange, scabies, *Sarcoptes scabiei* var. *cameli,* skin lesions, treatment with medicinal plants, *Aloe vera* leaves, medicinal plants, treatment.

Manisha Mathur; Hemant Dadhich; Sharma, GD; Sandeep Khare. **Histopathological observations of interface dermatitis in camel (*Camelus dromedarius*) in different areas of Rajasthan.** *Veterinary Practitioner.* 2005; 6(2): 151-152. ISSN: 0972-4036

Descriptors: dromedary camels, camel pathology, interface dermatitis, diagnosis, histopathology, skin diseases, regional variations, Rajasthan, India.

Manisha Mathur; Hemant Dadhich; Sharma, GD; Sandeep Khare. **A study of haemato-biochemical changes in camels affected with cutaneous ectoparasitoses in Rajasthan.** *Veterinary Practitioner.* 2005; 6(2): 131-132. ISSN: 0972-4036

Abstract: This study was conducted to determine the various skin problems in camels in Rajasthan, India [date not given] and the effects of skin diseases on their blood picture and chemistry. Out of 187 affected cases, cutaneous ectoparasitoses was found in 22 camels (11.76%) and 16 blood samples were taken to study the haemato-biochemical changes. Among the haematological parameters observed were decrease in TEC, Hb, PCV, MCHC, lymphocyte counts and an increase in TLC, neutrophil counts and eosinophil counts. In terms of blood chemical parameters, an increase in blood glucose, total protein, albumin and globulin with a decrease in A:G ratio were found.

Descriptors: dromedary camels, *Sacrcoptes* mites, mange, ectoparasites, ectoparasitoses, disease prevalence; disease surveys, blood chemistry, blood picture, blood protein, blood-sugar, serum albumin, eosinophils, erythrocyte count, globulins, hematocrit, hemoglobin, leukocyte count, lymphocytes, neutrophils, Rajasthan, India.

Manisha Mathur; Hemant Dadhich; Sharma, GD. **A pathological and haematological study of diffuse dermatitis in camels.** *Veterinary Practitioner.* 2005; 6(1): 88-89. ISSN: 0972-4036

Descriptors: dromedary camels, skin lesions, dermatitis, dermis, disease markers, histopathology, hematology, hematocrit, hemoglobin, white blood cells, eosinophils, leucocytes, neutrophils, erythrocyte count, histiocytes, parasites, viruses, bacteria, viruses, pathology.

Manisha Mathur; Hemant Dadhich; Sandeep Khare. **Prevalence and histopathological observations of mange affected camel skin in different areas of Rajasthan.** *Journal of Camel Practice and Research.* 2005; 12(1): 65-67. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The prevalence and histopathology of mange affected skin of camels were recorded in the present study. It was recorded that the prevalence of mange was 11.78%. Grossly,

papules, crusts and eruptions were observed on the skin. Microscopically, there were minute cavities in the epidermal layer which showed hyperkeratosis and acanthosis and increased in stratum corneum and stratum germinativum. Some foci of proliferated fibrous connective tissues were also found. The affected follicles contained mites, keratinous debris and inflammatory infiltrations. The parasite obtained from the skin scrapings of affected camels was identified as *Sarcoptes scabei* var. *cameli.* Reproduced with permission of CAB.
Descriptors: dromedary camels, skin parasites, camel mange mites, *Sarcoptes scabiei* var *cameli*, lesions, clinical aspects, disease prevalence, ectoparasitoses, histopathology.

Parmar, AJ; Veer Singh; Chaudhary, SS; Prajapati, BH; Sengar, YS. **Haematobiochemical studies on sarcoptic mange in camel (*Camelus dromedarius*) in Banaskantha district (North Gujarat).** *Journal of Parasitic Diseases.* 2005; 29(1): 71-73. ISSN: 0971-7196
Abstract: Haematological and biochemical studies were conducted in camels naturally infected with sarcoptic mange in Banaskantha district in North Gujarat, India [date not given]. Blood changes revealed highly significant lower values in haemoglobin, total erythrocyte count, packed cell volume, neutrophil and MCHC in affected camels. Total leukocyte count and MCV showed significantly higher values in affected camels. Biochemical studies showed significant lower values in total protein, albumin, globulin, A:G ratio, and calcium in affected camels.
Descriptors: dromedary camels, *Sarcoptes scabiei,* mange, blood plasma proteins; calcium-; red blood cells, white blood cells, erythrocyte count, globulins, hemoglobin, leukocyte count, neutrophils, serum albumin, Gujarat, India.

Parmar, AJ; Veer Singh; Sengar, YS. **Epidemiological studies on sarcoptic mange in camel (*Camelus dromedarius*) in Banaskantha district (North Gujarat).** *Journal of Parasitic Diseases.* 2005; 29(1): 67-70. ISSN: 0971-7196
Abstract: The epidemiological data on incidence of sarcoptic mange in camels in Banaskantha district in North Gujarat, India, were analysed in relation to age, nutritional status, sex, body condition, and hygienic condition [date not given]. The incidence of sarcoptic mange was 57.97%. Higher incidence was observed in the camels aged between 5-10 years. Difference in the sex-wise incidence of sarcoptic mange was non-significant. Comparatively higher prevalence was recorded in camels with poor body condition and kept under poor hygienic condition. Analysis of month-wise incidence indicated increasing trend from May to December. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Sarcoptes scabiei*, mange, skin parasites, hygiene, nutritional status, seasonal variation, Gujarat, India.

Parmar, AJ; Veer Singh; Momin, RR; Parsani, HR; Sengar, YS. **Clinical studies of sarcoptic mange in camel (*Camelus dromedarius*) in Banaskantha District (North Gujarat).** *Journal of Camel Practice and Research.* 2005; 12(1): 57-58. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Clinical studies were conducted in camels (n=138) naturally infected with sarcoptic mange. Clinically affected camels experienced restlessness, emaciation, weakness and marked reduction in milk production and working capacity. Affected camels exhibited alopecia with thick, wrinkled skin over the neck, medial aspect of thigh and brisket region and oozing of

serous fluid or blood. Pruritus was observed in the affected camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, skin parasites, lesions, *Sarcoptes*, clinical aspects, ectoparasitoses, mange, reduced milk production, Gujarat, India.

Rajender Kumar; Gorakh Mal; Sena, DS. **Comparative efficacy of fenvalerate, deltamethrin, amitraz and ivermectin against sarcoptic mange in camel.** *Indian Veterinary Journal.* 2005; 82(1): 88-89. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: The objective of this study was to evaluate the efficacy of fenvalerate, deltamethrin, amitraz and ivermectin in controlling sarcoptic mange in camels. 15 camels suffering from sarcoptic mange were divided into 5 groups. Groups I, II and III were sprayed with 500 ppm fenvalerate, 50 ppm deltamethrin and 500 ppm amitraz thrice at an interval of 7 days, respectively. Group IV was subcutaneously administered with ivermectin at 0.02 mg/kg body weight, whereas group V was kept as untreated control. Considerable reduction in mites of all stages was observed after 7 days of treatment in groups I, II and III. Complete recovery was observed after the 3rd spray in groups I, II and III. Group IV camels recovered after a single treatment. After 21 days, no mites were observed in the skin scrapings. The condition of the camels in group V was further aggravated due to intense pruritus.
Descriptors: dromedary camels, *Sarcoptes scabiei*, scabies, pruritus, mange control, drug therapy, amitraz, deltamethrin, fenvalerate, ivermectin, pharmacodynamics, drug action.

2004

Dioli, M; Fox, MT. **First record of the camel tick *Rhipicephalus muhsamae* in Kenya on a one-humped camel (*Camelus dromedarius*).** *Veterinary Record*-London. 2004 Aug 14; 155(7): 206-208. ISSN: 0042-4900
URL: http://veterinaryrecord.bvapublications.com
NAL call no: 41.8 V641
Descriptors: dromedaries, ticks, first record, *Rhipicephalus muhsamae*, Kenya.

Dixit, SK; Tuteja, FC; Sena, DS; Singh, R; Sharma, N. **Miticidal properties of a herbal formulation on camel.** *Veterinary Practitioner.* 2004; 5(2): 114-116. ISSN: 0972-4036
Descriptors: dromedary camels, mites infestations, mite control, herbal medicines, medicinal plant, efficacy, medicinal properties of drug plants

Dixit, SK; Tuteja, FC; Singh, AP; Sharma, N. **Management of sarcopticosis in one humped camel - a comparative study.** *Veterinary Practitioner.* 2004; 5(1): 11-16. ISSN: 0972-4036
Descriptors: dromedary camels, skin parasites, *Sarcoptes scabiei* var *cameli*, ectoparasites, scabies, mange, aminotransferases, drug formulations, medicinal plants, efficacy of herbal drugs, parasitoses.

El Jaouhari, S; Ouhelli, H; Yassine, F. **A propos de cas de teignes du dromadaire au Maroc.[Cases of dromedary ringworm in Morocco.]** *Journal de Mycologie Medicale*. 2004; 14(2): 83-87. ISSN: 1156-5233. Note: In French with an English summary.
Abstract: The prevalence of ringworm infection was determined in 96 camels in the Sahara (Morocco) during June 2002-April 2003. Seventy-one animals were healthy and 25 (26.04%) had lesions. Lesions were found on the head and body. Infection was very frequent among young animals aged less than 3 years and was predominant during winter and autumn. Mycological examination revealed the presence of only one dermatophyte species, *Trichophyton sarkisovii*. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Trichophyton sarkisovii,* dermatomycoses, fungal infection of the skin, disease prevalence, epidemiology, Morocco.

Gadallah, Neveen S; Bosly, Hanan A. **Diptera associated with camels in the Jeddah region, western Saudi Arabia.** *Fauna of Arabia.* 2006; 21: 339-350. ISSN: 1660-2889. Note: In English with Arabic and English summaries.
Descriptors: *Camelus dromedarius*, dipteran parasites associated with camels, parasite survey, new host record, Jeddah, Saudi Arabia.

James Rugu, NN; Jidayi, S. **A survey on the ectoparasites of some livestock from some areas of Borno and Yobe States.** *Nigerian Veterinary Journal.* 2004; 25(2): 48-55. ISSN: 0331-3026
URL: http://www.ajol.info/viewarticle.php?jid=19&id=19254&layout=abstract
A**bstract:** An investigation on the ectoparasites of livestock from Maiduguri Metropolitan and Askira Uba (Borno State), Fika and Nangere (Yobe State), Nigeria, was conducted. A total of 1600 camels, 2200 cattle, 500 sheep, 400 goats, 230 dogs and 250 pigs were examined for ectoparasites. Ticks, lice and flies were the ectoparasites recorded. Infestation rate of ticks was high on camels, cattle and dogs. Tick infestation rates on sheep and goats were 43.0 and 26.5%, respectively. The species of ticks recorded were all from the Family Ixodidae. Ticks on camels were *Hyalomma rufipes*, *Hyalomma dromedarii*, *Boophilus decoloratus* and *Hyalomma truncatum*. In order of predominance, cattle were infested with *B. decoloratus*, *Hyalomma truncatum*, *Rhipicephalus sanguineus*, *Haemaphysalis leachi* and *Amblyomma lepidum*. Sheep and goats were also infested with ixodid ticks, though the infestation rates were relatively low. The flies trapped in this study comprised of members of the order Diptera, while lice were from the order Anoplura. The level of infestation rates of ectoparasites in relation to age groups and sex of hosts were assessed. The population of the ectoparasites on different hosts showed wide differences. Reproduced with permission of CAB.
Descriptors: domestic animals, dromedary camels, sheep, pigs, dogs, goats, disease prevalence, disease surveys, ectoparasites, ectoparasitoses, epidemiological surveys, epidemiology, species differences, Ixodidae, Metastigmata, Phthiraptera, Anoplura, Diptera, *Amblyomma lepidum*; *Haemaphysalis leachi*; *Hyalomma dromedarii*, *Hyalomma marginatum rufipes*, *Hyalomma truncatum*, *Rhipicephalus decoloratus*, *Rhipicephalus sanguineus*, *Hyalomma rufipes, Boophilus decoloratus*, Nigeria.

Kataria , AK ; Kataria, N. **Immunoradiometric assay of serum IgE levels in dromedary camel.** *Journal of Camel Practice and Research.* 2004; 11(1): 11-13. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to determine the total IgE levels in the sera of healthy camels and of those affected with mange using radioimmunoassay. The total IgE levels were estimated in 54 camels (*Camelus dromedarius*) and related with the total eosinophil counts obtained. The sera collected from 30 adult healthy camels (18 males and 12 females) and 24 camels (14 males and 10 females) affected with mange were analysed. Significantly higher levels of IgE were recorded in camels suffering from mange than in healthy camels. An insignificant difference was recorded between male and female camels. Slightly higher counts of eosinophils were recorded in camels with raised IgE levels. Reproduced with permission of CAB.
Descriptors: dromedary camels, serum IgE levels, healthy camels, mange infected camels, immune response, eosinophil counts, immunoradiometric assay, immunological reactions, regain, reaginic antibodies.

Kilic, N; Kirkan, S. **Actinomycosis in a one-humped camel (*Camelus dromedarius*).** *Journal of Veterinary Medicine Series A.* 2004; 51(7/8): 363-364. ISSN: 0931-184X
Abstract: An actinomycotic granuloma caused by *Actinomyces viscosus* is reported in a dromedary camel. Two hard, cutaneous, large granulamatous nodules were present on both sides of the postero-ventral side of the mandible exhibiting exudation and necrosis. After radical excision of the lesion, the daily treatment with penicillin-streptomycin combination was continued for 4 weeks. About 8 and 24 weeks from the initial treatment, no new nodules were noticed. Reproduced with permission of CAB.
Descriptors: dromedary camel, granulomatous nodules of the mandible, *Actinomyces viscosus* infection, clinical aspects, case study, symptoms, treatment with excision, antiobiotics, penicillin and streptomycin combination drug therapy, case report.

Mahran, OM; Saleh, MA. **Prevalence of ectoparasites and their effect on some biochemical indices in camels (*Camelus dromedarius*) at Shalatin City.** *Assiut Veterinary Medical Journal*. 2004; 50(100): 164-187. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: A field and abattoir survey was conducted on 810 male and female camels at different ages and seasons to study the prevalence of ectoparasites at Shalatin City, Red Sea Governorate, Egypt. Of 680 examined camels in the field study, 45.59% revealed infestation with ectoparasites. Of these, 11.76% were infested with *Sarcoptes scabiei* var. *cameli*, 30.14% with ticks and 3.67% showed mixed infestations. The incidence of ectoparasites in the abattoir survey was higher (87.7%) because of the high incidence of *Cephalopenia titillator* (67.69%). Tick species such as *Hyalomma dromedarii*, *Amblyomma lepidum* and *Ornithodoros savignyi* were recorded. Older camels were more susceptible than younger individuals. Mange mites and bot flies were more prevalent with a higher intensity in female than in male camels. Tick infestation was more prevalent in males but females had a higher burden. The highest rate of mite and nasal bot infestation was recorded in winter while the lowest was in summer. Normocytic normochromic anaemia was the hallmark of tick and nasal bot infestation, but infestation with mites revealed microcytic hypochromic anaemia. All infested groups showed

leukocytosis accompanied by lymphocytosis and eosinophilia. Proteinograms showed hypoproteinaemia consequent to hypoalbuminaemia and hyperglobulinaemia. There was marked hyper- alpha -globulinaemia and hyper gamma -globulinaemia without changes in the beta -globulin fraction. Cases of sarcoptic mange treated with ivermectin showed disappearance of clinical signs and restored haematological and biochemical indices. Reproduced with permission of CAB.
Descriptors: dromedary camels, males, females, varying ages, sex differences on infestation, ectoparasites, *Cephalopenia titillator*, bot flies, *Hyalomma dromedarii*, *Amblyomma lepidum*, *Ornithodoros savignyi*, ticks, *Sarcoptes scabiei*, mites, mange, parasite prevalence on slaughtered camels, blood chemistry, disease prevalence, hematology, ivermectin, seasonal differences, Egypt.

Saleem, AN; Al Hadidi, MAF. **Efficacy of some drugs used in the treatment of naturally occurring mange in camels.** *Iraqi Journal of Veterinary Sciences.* 2004; 18(1): 49-62. ISSN: 1607-3894
Abstract: The efficacy of ivermectin, diazinon and cypermethrin in the control of sarcoptic mange in Arabian camels (*Camelus dromedaries*) was evaluated. The animals were divided into four group and were treated with: ivermectin 1% (0.2 mg/kg b.w.) s.c. (group I); two doses of ivermectin 1% given 7 days apart (group II); diazinon (60) (group III) and local cypermethrin (group IV). The animals were examined clinically for the types and distribution of mange and for the presence of other infections. Haematological and biochemical analyses were conducted on days 6, 14, 21 and 28 of the treatment. Skin scraping samples were examined for mite number and presence of their ova. Haematological examination included Hb, PCV, DLC and TLC while the biochemical analysis included determination of ALT, AST and TP. Clinical examination of the infected animals showed signs of itchiness, pruritus, restlessness, thickening and dryness of the affected areas and oozing of blood and serum, especially in severely affected areas. Skin lesions were distributed on the face, around the eyes, neck, upper parts of the limbs, trunk and tail. The lesions usually involved more than one area. The results revealed that group II camels showed the best response to treatment. Haematological and biochemical results revealed an improvement toward normal values post-treatment. In conclusion, this study shows greater efficacy of ivermectin in the treatment and control of mange in camels compared to diazinon and cypermethrin. Ivermectin can also be applied easily and has lower toxicity.
Descriptors: dromedary camels, mange, *Sarcoptes*, ectoparasites, blood chemistry, cypermethrin, diazinon, dosage effects, drug therapy, potency, hematology.

Wellehan, JFX; Farina, LL; Keoughan, CG; Lafortune, M; Grooters, AM; Mendoza, L; Brown, M; Terrell, SP; Jacobson, ER; Heard, DJ. **Pythiosis in a dromedary camel (*Camelus dromedarius*).** *Journal of Zoo and Wildlife Medicine.* 2004; 35(4): 564-568. ISSN: 1042-7260
Abstract: A 4.5-yr-old male dromedary camel (*Camelus dromedarius*) was evaluated for a mass on the right side of the face. A complete blood count and blood chemistry revealed anemia and hypoproteinemia. Radiographs did not reveal bony involvement. The mass was resected and *Pythium insidiosum* was cultured. The camel was treated with an experimental immunotherapeutic vaccine and with sodium iodide and ceftiofur. The camel began to lose weight postoperatively and died 6 mo later. At necropsy, the camel was found to have gastritis of the third compartment of the stomach with intralesional hyphae of this oomycete

pathogen. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Pythium insidiosum*, cetiofur, anemia, blood chemistry, differential diagnosis, gastritis, histopathology, hypoproteinemia, surgery, vaccination.

Zeleke, M; Bekele, T. **Species of ticks on camels and their seasonal population dynamics in Eastern Ethiopia.** *Tropical Animal Health and Production*. 2004 Apr; 36(3): 225-231. ISSN: 0049-4747. Note: in English with Spanish and French summaries.
NAL call no : SF601.T7
Descriptors: dromedaries, tick infestations, *Rhipicephalus pulchellus* (85.2%), *Hyalomma dromedarii* (5.9%), *Amblyomma, gemma* (4.0%) *Amblyomma variegatum* (1.8%) *Boophilus decoloratus*, traditional farming, seasonal variation, wet season; parasite levels, infestation severity, Ethiopia.

Arabian: Bacterial Pathogens

2008

Al Majali, Ahmad M; Al Qudah, Khaled M; Al Tarazi, Yasser H; Al Rawashdeh, Odeh F. **Risk factors associated with camel brucellosis in Jordan.** *Tropical Animal Health and Production.* 2008 Apr; 40(3): 193-200. ISSN: 0049-4747
DOI: http://dx.doi.org/10.1007/s11250-007-9080-7
NAL call no : SF601 .T7
Abstract : During the period between February, 2004 and December, 2006, a cross-sectional study was performed to investigate some epidemiological aspects related to camel brucellosis in Jordan. Four hundred twelve camel sera from 37 herds were randomly collected and analyzed using Rose Bengal plate test and complement fixation test. A structured pre-tested questionnaire was administered to collect information on camel herd health and management. A multivariable logistic regression model was constructed to investigate risk factors associated with seropositivity to Brucella antigens. Moreover, the incidence of *Brucella*-specific abortion was investigated in 7 camel herds located in different locations in Southern Jordan. The true prevalence of *Brucella*-seropositive in camels was 12.1%. Thirteen (35.1%) herds had at least one positive camel. The seroprevalence of brucellosis in camels was significantly higher in the southern part of Jordan than that in central or northern Jordan. The multivariable logistic regression model on both individual and herd levels revealed large herds and contact with small ruminants as risk factors for *Brucella* seropositivity. On the other hand, using disinfectants was identified as a protective factor (OR = 0.8; 95% CI: 0.1, 0.9) only on the camel herd level. The incidence of *Brucella*-caused abortion was 1.9%. *Brucella melitensis* biotype 3 was isolated from 4 aborted camel fetuses.
Descriptors: camels, brucellosis, *Brucella melitensis*, prevalence, risk factors, Jordan.

Bekele, Samuel T. **Gross and microscopic pulmonary lesions of camels from Eastern Ethiopia.** *Tropical Animal Health and Production.* 2008 Jan; 40(1): 25-28. ISSN: 0049-4747
URL: http://dx.doi.org/10.1007/s11250-007-9046-9
NAL call no: SF601 .T7
Abstract: Camels are important animals for pastoralists in the northeastern, eastern, southeastern and southern parts of Ethiopia. This paper reports on abattoir study of respiratory lesions in 104 adult camels at the Dire Dawa abattoir (88 male and 16 female). The study showed 98% of the examined lungs had one or more lesions. The most common lesions were pulmonary fibrosis (50.00%), pneumoconiosis (34.62%), hydatid cyst (30.80%), pulmonary abscess (3.85%) and parasitic bronchopneumonia (0.96%). The distribution of pneumoconiosis and hydatid cyst varied significantly ($p < 0.05$) among different lobes, the highest being seen in the caudal lobe. For the different lesions there was no significant ($p > 0.05$) difference in distribution among male and female camels. Possible explanations for the occurrence of the lesions are discussed. And recommendations forecasted are made.
Descriptors: camels, adult animals, post slaughter sampling, respiratory lesions, pulmonary

fibrosis (50.00%), pneumoconiosis (34.62%), hydatid cyst (30.80%), pulmonary abscess (3.85%), parasitic bronchopneumonia, Ethiopia.

El Hakim, UA. **Some clinical, diagnostic and epidemiological studies on *Chlamydophila* infection in camels.** *Assiut Veterinary Medical Journal.* 2008; 54(117): 231-251. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: The study was conducted to investigate the forms of *Chlamydophila* infection in camels and their role in the transmission of this organism to other animals. 30 camels and 300 sheep from 6 different farms, where camels and sheep are kept together, in the Western region of Saudi Arabia, were used [date not given]. Three of these farms suffered from abortion in sheep. Enzyme linked immunosorbent assay (ELISA) and polymerase chain reaction (PCR) were used for diagnosis. The tests were performed on serum and milk samples of camels and sheep for three successive times at one month apart between each two examinations. Results of clinical examination showed that some camels infected with *Chlamydophila* suffered only from respiratory signs while some sheep aborted and others suffered from mild to severe respiratory signs. No abortion was recorded in the infected camels. Diagnostic study showed infection of camels by three species of *Chlamydophila* (*C. abortus*, *C. pecorum* and *C. pneumoniae*) while only *C. abortus* and *C. pecorum* were recorded in sheep. ELISA was not able to differentiate the species of *Chlamydophila* while PCR can differentiate the three *Chlamydophila* spp. Collected data and disease history of the studied farms showed seroconversion of 16 sheep and detection of *Chlamydophila* nucleic acid in 25 sheep after introduction of newly-purchased *Chlamydophila*-infected camels to the farm. Prior to the introduction of camels, the farms had no history of abortion and *Chlamydophila* infection. The results show that camels play an important role in the transmission and epidemiology of *Chlamydophila* infection. PCR assay was more sensitive than ELISA, where it gave positive results in 18 camels and 142 sheep while ELISA was positive in 11 camels and 109 sheep only. At the same time, PCR also did not show false positive results in vaccinated sheep, while all vaccinated animals were positive in ELISA.

Descriptors: dromedary camels, sheep, *Chlamydophila abortus*, *Chlamydophila pecorum*, *Chlamydophila pneumoniae*, abortion, clinical aspects, diagnosis, disease transmission, ELISA, epidemiology, polymerase chain reaction, PCR, seroconversion, Saudi Arabia.

El Sayed, A; Ahmed, S; Awad, W. **Do camels (*Camelus dromedarius*) play an epidemiological role in the spread of Shiga Toxin producing *Escherichia coli* (STEC) infection?** *Tropical Animal Health and Production.* 2008 Aug; 40(6): 469-473. ISSN: 0049-4747

DOI: http://dx.doi.org/10.1007/s11250-007-9122-1

NAL call no: SF601 .T7

Abstract: In the present work, faecal and serum samples from 400 camels were investigated for the presence of Shiga Toxin producing *E.coli* (STEC) and Anti-Shiga Toxin (Anti-Stx) antibodies, respectively. The used samples were obtained from adult male camels of five east African countries (Egypt, Somalia, Djibouti, Kenya and Sudan) between the years 2002-2004. One *E.coli* isolate per camel was randomly selected to be cultured on Gassner, Chromocult and sorbit agar for the detection of O157:H7 strains. In the same time, a Stx-specific PCR screening was performed for the isolates using the shiga toxin specific primers

Mk1-Mk2. Vero cells were also used for Shiga Toxin neutralization assay. None of the investigated isolates reacted positively with the Stx-specific primers. Also, none of the studied sera could neutralize the Stx on tissue culture. The obtained results indicate that camels do not play any significant epidemiological role in STEC infection and transmission. The possible reasons for the absence of STEC in the investigated samples are discussed in brief.
Descriptors: dromedary camels, adult males, Shiga Toxin producing *E.coli* strains, STEC, epidemiology, disease transmission, Djibouti, Egypt, Kenya, Somalia, Sudan.

Hussein, MF; AlShaikh, M; El Rab, MOG; Aljumaah, RS; El Nabi, ARG; Bagi, AMA. **Serological prevalence of Q fever and chlamydiosis in camels in Saudi Arabia.** *Journal of Animal and Veterinary Advances*. 2008; 7(6): 685-688. ISSN: 1680-5593
Abstract: Tests for antibodies against *Coxiella burnetii* and *Chlamdophila abortus* were conducted in 460 and 186 Saudi camels, respectively, using an enzyme immunoassay technique. The serological prevalence of coxiellosis was 62% while that of chlamydiosis was 19.4%. Neither of these infections was associated with overt clinical disease in the camels and in both cases seropositivity was higher in adult than young camels. The prevalence of antibodies against *C. burnetii* was closely similar in male and female camels, while a much higher prevalence of anti-chlamydial antibodies was observed in female as compared to male camels. This is the first record of both infections among indigenous camels in Saudi Arabia. Reproduced with permission of CAB.
Descriptors: dromedary camels,epidemiology, Q fever, seroprevalence, sex differences, Chlamydiaceae, *Coxiella burnetii*, abattoir fever, Balkan grippe, *Chlamydophila abortus*, Derrick Burnet disease, Nine Mile fever, pneumorickettsiosis, quadrilateral fever, query fever, Saudi Arabia.

Kathiriya, JB; Shah, NM. **Antibiogram of micro-organisms isolated from subclinical mastitis in camels.** *Indian Veterinary Journal*. 2008; 85(8): 813-815. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: The study was conducted to determine the drug resistance and sensitivity of *Staphylococcus*, *Escherichia coli*, *Bacillus cereus*, *Pseudomonas aeruginosa*, *Micrococcus* and *Corynebacterium bovis* isolated from camels with subclinical mastitis. The organisms were tested against gentamicin, neomycin, colistin, enrofloxacin, chloramphenicol, cephaloridine, ampicillin and streptomycin. Results revealed that none of the antibiotics tested were fully effective against the bacterial organisms and none of the organisms were fully resistant to the examined antibiotics. It was observed that all isolates were highly sensitive to enrofloxacin. The antibiotic resistance of bacterial isolates ranged between 10.23-75.00%. Reproduced with permission of CAB.
Descriptors: camels, mastitis, *Staphylococcus*, *Escherichia coli*, *Bacillus cereus*, *Pseudomonas aeruginosa*, *Micrococcus*, *Corynebacterium bovis*, drug resistance and sensitivity, antibiotics, ampicillin, chloramphenicol, enrofloxacin, gentamicin, neomycin, streptomycin, cephaloridine, Gram negative bacteria, multiple drug resistance, resistance mechanisms, colistin, subclinical mastitis.

Musa, MT; Eisa, MZM; El Sanousi, EM; Wahab, MBA; Perrett, L. **Brucellosis in Camels (*Camelus dromedarius*) in Darfur, Western Sudan.** *Journal of Comparative Pathology*. 2008 Feb-Apr; 138(2-3): 151-155. ISSN: 0021-9975
DOI: http://dx.doi.org/10.1016/j.jcpa.2007.10.005
NAL call no: 41.8 J82
Abstract: In a field outbreak of brucellosis in 21 camels mixed with cattle, sheep and goats, five camels, three of which showed clinical signs, were serologically positive. In a subsequent abattoir survey of apparently healthy camels, six animals were seropositive, albeit with titres that tended to be lower than those found in the field outbreak. Of the six seropositive slaughtered camels, five were shown to have lymph nodes (prescapular and supramammary) infected with brucellae (*Brucella melitensis* biovar 3, two camels; *Brucella abortus* biovar 6, three camels). Infection of camels with *B. abortus* biovar 6 had not previously been reported. Infection of the supramammary lymph nodes presents a potential hazard to those who consume raw camels' milk, a common practice in nomadic camel owners.
Descriptors: dromedary camels, brucellosis, *Brucella melitensis*, *Brucella melitensis* biovar 6, *Brucella melitensis* biovar 3, *Brucella abortus* biovar 6, disease outbreaks, seroprevalence, serotypes, signs and symptoms (animals-and-humans), infection, lymph nodes, disease surveillance, slaughterhouses, Sudan.

Savalia, CV; Mahendra Pal. **Studies on the reservoir status of leptospirosis in Gujarat.** *Indian Journal of Field Veterinarians.* 2008; 4(1): 7-9. ISSN: 0973-3175
URL: http://www.ivri.nic.in
Abstract: An overall seroprevalence of leptospirosis in 761 animals of Southern Gujarat screened was 14.85 per cent. The species-wise data showed the highest infection rate in donkeys (17.65%) followed by sheep (16.00%), goats (15.38%), cattle (14.77%), buffaloes (14.55%), horses (14.29%), dogs (13.95%) and camels (12.40%). This high prevalence of leptospira antibodies in different animals suggests their possible role as reservoir of infection for human being in the area facing every year outbreak of this disease.
Descriptors: dromedary camels, cattle, dogs, goats, horses, sheep, donkeys, asses, buffalo, antibodies, disease prevalence, disease surveys, epidemiological surveys, epidemiology, leptospirosis, *Leptospira,* pathogen reservoir hosts, serological surveys, seroprevalence, zoonoses, Gujarat, India.

Tejedor Junco , MT ; Lupiola, P; Schulz, U; Gutierrez, C. **Isolation of nitrate-reductase positive *Corynebacterium pseudotuberculosis* from dromedary camels.** *Tropical Animal Health and Production*. 2008 Apr; 40(3): 165-167. ISSN: 0049-4747
DOI : http://dx.doi.org/10.1007/s11250-007-9077-2
NAL call no : SF601.T7
Abstract: Two male non castrated dromedary camels aged 22 months and 7 years belonging to a camel farm (N=19) located in Lanzarote island, Spain with enlarge lymph nodes were evaluated. Samples of lymph nodes were examined using nitrate reduction tests and results showed that the isolates (N=2) was *Corynebacterium pseudotuberculosis*. The isolates was subjected to antibiotic susceptibility tests (19 antibiotics) and showed that both of the isolates were resistant to streptomycin but sensitive to the rest (penicillins, ampicillin, amoxi-

cillin, piperacillin, cefotaxime, ceftazidime, imipenem, chloramphenicol, erythromycin, tetracycline, amikacin, gentamicin, sulphamethoxazole and norfloxacin). Reproduced with permission of CAB.
Descriptors: camels, abcess isolate, lymph nodes, bacterial infection, pathogenic bacteria, pseudotuberculosis, *Corynebacterium pseudotuberculosis*; nitrate reductase positive, Spain.

2007

Adamu , NB ; Okoh, AEJ; Azunku, UJ. **Prevalence of brucellosis in nomadic herds of dromedaries in Borno State, Nigeria.** *Journal of Camel Practice and Research.* 2007; 14(2): 135-138. ISSN: 0971-6777.
URL: http://www.camelsandcamelids.com
Abstract: One-hundred-and-eighty-one milk samples were collected from camels raised in Borno, Nigeria [date not given]. All samples were examined by culture and the milk ring test (MRT) for the detection of brucellosis. Serological and cultural examination were carried out in randomly selected herds for evidence of brucellosis in 4 local government areas of Borno known to keep large numbers of dromedaries. The overall prevalence of brucellosis in this study was 8.3% but varied from 4.9% in Marte local government area to 10% in Kukawa local government area. *Brucella* sp. were not isolated from the milk samples. The study, however, showed evidence of brucellosis in camels in all the 4 local government areas sampled. The public health implication of drinking raw camel milk as practiced by camel owners and their communities is highlighted and further screening of camels in rural areas is suggested to determine their role in the epidemiology of brucellosis in this part of Nigeria. Reproduced with permission of CAB.
Descriptors: dromedary camels, raw camel milk, agglutination tests, brucellosis, disease prevalence, serological surveys, seroprevalence, disease surveys, epidemiological surveys, epidemiology, food contamination, food safety, microbial contamination, milk hygiene, public health, Nigeria.

Ahmed, SM; Hegde, BP. **Preliminary study on the major important camel calf diseases and other factors causing calf mortality in the Somali Regional state of Ethiopia.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference " Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 31-41.
Abstract: This study was undertaken in 5 randomly selected districts of Aider zone. 15 households were selected from each district. A total of 75 households were included in this study. Random sampling technique was used. Calf mortality was seen as prenatal death due to abortion, postnatal death from first week to 3 months of calf age and before weaning period. The latter was mainly caused by some endemic diseases and other associated factors. In this study, the abortion rate was 16% and was caused by several factors. These included accidental death of fetus and trypanosomiasis, which contributed 64.3 and 28.6%, respectively, in the case of Jarati, whereas trypanosomiasis and stress conditions contributed 40 and 46.7%, respectively, in the case of Hargelle. On the other hand, stress conditions caused by adverse environmental conditions and unidentified poisonous plants contributed 26.7 and

73.3%, respectively, in the case of Barey. Similarly, trypanosomiasis, accidental death and stress conditions and browsing of poisonous plants contributed 33.3, 40.0, 20.0 and 6.7%, respectively, in the case of Dollo-Bay. With regard to El-kari district, about 66.7, 26.7 and 6.7% of respondents claimed that abortion was caused by accidental deaths, poisonous plants and stressful conditions, respectively. On the other hand, calf death was very high during the first week after birth. About 60, 50, 55, 45, 35% of Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggested that an average 51% of calf losses were encountered during the first week of calves. Calf mortality of about 30% was encountered during the first 90 days of calf age, whereas the remaining 19% were encountered after 90 days of calf life before weaning. Poor colostrum feeding practice was also believed to be one of the major causes of calf mortality during the first week of life. Furthermore, some endemic diseases and other associated factors were also reported to be among the major causes of calf mortality during the lactation period before weaning. The most important disease found was calf scour (daab). The morbidity and mortality rates of calf scour were 87 and 39%, respectively. Sunken eye (ilqod) was considered as the second problematic disease of calves by herders. The disease caused serious economic losses to the households through loss of milk after death of the calves. The morbidity and mortality rates due to sunken eyes were 57 and 12%, respectively. Contagious ecthyma (canbaruur) was considered as one of the important diseases of calves by herders. The morbidity and mortality rates of contagious ecthyma were 75 and 6.9%, respectively. Contagious necrotic skin was also considered as one of the important diseases of calves by herders. About 88% of all districts reported that the disease affected their calves with morbidity and mortality rates of 35 and 4.6%, respectively. Other endemic diseases reported were trypanosomiasis with morbidity and mortality rates of 9.6 and 6.7%. Camel pox had morbidity and mortality rates of 42 and 7%, respectively. Pneumonia had a mortality rate of 7%. On the other hand, factors causing calf losses included predation which was about 4.8, 23.8, 26.6, 16.7, and 26.2% in Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggesting that predators were considered next to diseases in causing calf mortality. Reproduced with permission of CAB.

Descriptors: dromedarycamels, calves, fetal abortion, age differences, animal diseases, anthrax, camel milk, colostrum, deformities, diarrhea, losses scarcoptic mange, morbidity, mortalitynecrosis, pneumonia, poisoning, poisonous plants, predation, stress, toxicity, trypanosomiasis, viral diseases, *Bacillus anthracis*, contagious ecthyma virus, plants, *Trypanosoma*, contagious pustular dermatitis, CPD virus, death rates, diarrhea, orf virus, scabby mouth, sore mouth, toxic plants, toxicosis, trypanosomosis, ulcerative dermatosis, viral infections, Abyssinia, Ethiopia.

Al Dubaib, MA. **Polymerase chain reaction and adapted enzyme linked immunosorbent assay for diagnosis of camel brucellosis.** *Veterinary Medical Journal Giza*. 2007; 55(4): 1067-1075. ISSN: 1110-1423. Note: In English with an Arabic summary.

Abstract: In the present study, polymerase chain reaction was carried out on 10 brucella isolates recovered from camels affected with brucellosis central region of Saudi Arabia. *Brucella abortus* as well as *Brucella melitensis* specific primers were employed for the assay. All isolates were identified as *B. melitensis.* This was in agreement with the results of the traditional bacteriological identification. Moreover, antibodies against camel IgG was raised in rabbits and purified with polystyrene affinity chromatography. The purified anti-camel IgG was

conjugated with horseradish peroxidase (HRPO) using the sodium periodate method. The anticamel-HRPO conjugate prepared in this study was tested in an indirect ELISA adapted in the same study on camel sera positive and negative for brucellosis as indicated by the Rose Bengal plate test. The conjugate was found efficient and was able to elucidate positive and negative samples at a dilution of 1/40. Reproduced with permission of CAB.
Descriptors: dromedary camels, antibodies, antibody testing, brucellosis, diagnosis, diagnostic techniques, enzyme linked immunosorbent assay, ELISA, IgG, immunodiagnosis, PCR, rose Bengal, *Brucella melitensis*, antibody detection, antibody tests, serological diagnosis, Saudi Arabia.

Al Majali, AM; Ismail, ZB; Al Hami, Y; Nour, AY. **Lactoferrin concentration in milk from camels (*Camelus dromedarius*) with and without subclinical mastitis.** *International Journal of Applied Research in Veterinary Medicine.* 2007; 5(3): 120-124. ISSN: 1542-2666
URL: http://www.jarvm.com
Abstract: The purposes of this study were to investigate the levels of lactoferrin in 180 normal and 132 mastitic camel milk samples and to elucidate the effect of age, lactation stage, presence of pathogens, and somatic cell counts (SCC) on the concentration of lactoferrin in camel milk using radial immunodiffusion test. The mean log concentration of lactoferrin from mastitic camels (3.8+or-0.67) was significantly higher than that in normal camels (2.65+or-0.88). The mean log concentrations of lactoferrin in 3- and 4-year-old lactating camels were significantly higher than that in older camels. A correlation was observed between the levels of lactoferrin in normal and mastitic camel milk and the SCC score. The log lactoferrin concentrations in subclinical mastitic camel milk infected with Staphylococcus aureus and coagulase-negative staphylococci isolates were significantly higher than those for other bacterial isolates. No differences in the concentration of lactoferrin were observed in reference to the stage of lactation. These data could help in understanding the mechanisms of udder resistance to infections. In addition, levels of lactoferrin in milk could be used as a diagnostic tool in cases of subclinical mastitis.
Descriptors: dromedary camels, lactation, lactation stage, age differences, disease markers, lactoferrin, mastitis, milk composition, milk quality, somatic cell count, subclinical mastitis, coagulase negative staphylococci, *Staphylococcus aureus*.

Al Shaikh, MAA; Al Haidary, AI; Aljumaah, RS; Mohammed, OB; Al-Korashi, MM; Omer, SA; El Nabi, ARG; Hussein, MF. **First detection of *Brucella abortus* in camel serum in Saudi Arabia using the polymerase chain reaction.** *Journal of Applied Animal Research.* 2007; 31(2): 149-152, ISSN: 0971-2119. Note: In English with a Hindi summary.
Abstract: Polymerase chain reaction (PCR) was used to diagnose brucellosis in camels. DNA was extracted from 26 serum samples of camels that tested positive for brucellosis by 2 or more serological tests. PCR products indicating the presence of a *Brucella* spp. DNA were detected in all samples with primers that amplified the 31 kDa membrane protein and 18 samples with primers that amplified the 905 bp of the 16S rRNA. Using primers that amplified the IS711 locus, 8 samples revealed DNA amplification at around 500 bp, indicating that the organism involved was *Brucella abortus*. This was the first report on the use of PCR as a diagnostic tool for brucellosis in the serum of the camel. This was also the first record of B. abortus in that animal in Saudi Arabia. Reproduced with permission of CAB.

Descriptors: dromedary camels, *Brucella abortus*, blood serum, brucellosis, diagnosis, diagnostic techniques, DNA, geographical distribution, loci, new geographic records, PCR, ribosomal RNA, rRNA, deoxyribonucleic acid, Saudi Arabia.

Al Shaikh, MAA; Al Haidary, A; Aljumaah, RS; Al Korashi, MM; El Nabi, ARG; Hussein, MF. **Camel brucellosis in Riyadh Region, Saudi Arabia.** *Journal of Camel Practice and Research*. 2007; 14(2): 113-117. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Eight-hundred-fifty-nine serum samples were collected randomly from housed and free-ranging camels aged from less than 1 to more than 20 years in 4 parts of Riyadh Region, Saudi Arabia. Serological testing for Brucella antibodies was performed using Rose Bengal plate agglutination (RBPT), standard tube agglutination (STAT), competitive enzyme-linked immunosorbent assay (c-ELISA) and complement fixation (CFT) tests. Polymerase chain reaction (PCR) was used to confirm serologically positive samples and identify the causative agent. The results showed variation between different tests, with only 16 samples (1.86%) being positive by RBPT, 27 samples (3.14%) by STAT and 26 (3.03%) by c-ELISA. The STAT, however, revealed predominantly low titres, limiting its reliability as a screening test for chronically infected and carrier camels. CFT was positive in 34 samples (~4%) including all of those shown to be positive by other tests. Positive sera were further confirmed by PCR, which revealed B. abortus as the causative agent. The highest percentage of serologically positive camels was recorded in Wadi Al-Dawasir in the southern part and the lowest in the western part of Riyadh region. All serologically positive camels were females. The prevalence of infection was twice as high in housed than in free-ranging camels and the majority of positive cases were recorded in the age group 5-10 years. Differences in prevalence were observed between different local breeds, with the highest prevalence in the Shu'l camels. All serologically positive camels were clinically normal at the time of sampling. Based on these results, we recommend c-ELISA as screening test, CFT as a confirmatory test and application of PCR for determining the species of *Brucella* infecting camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Brucella abortus*, agglutination tests, serological diagnosis, antibodies, antibody testing, complement fixation tests; diagnosis, diagnostic techniques, brucellosis, age differences, breed differences, disease distribution, disease prevalence, disease surveys, epidemiological surveys, epidemiology, free range husbandry, geographical variation, immunodiagnosis, PCR, polymerase chain reaction, serological surveys.

Bani Ismail, Z; Al Rukibat, R; Al Tarazi, Y; Al Zghoul, MB. **Synovial fluid analysis and bacterial findings in arthritic koints of juvenile male camel (*Camelus dromedarius*) calves.** *Zentralblatt fur Veterinarmedizin—Journal of Veterinary Medicine Series A. Physiology Pathology Clinical Medicine Reihe A.* 2007 Mar; 54(2): 66-69. ISSN: 0514-7158
DOI: http://dx.doi.org/10.1111/j.1439-0442.2007.00889.x
NAL call no: 41.8 Z5
Abstract: Eighteen synovial fluid samples from 11 male dromedarian calves, 9-12 month old, were analysed cytologically and bacteriologically. Calves were lame and all joints were grossly swollen. The mean pl SD of total nucleated cell count was 7970 pl 5000 cells/ol (range 2800-20 000 cells/ol). Polymorphonuclear (PMN) leucocytes were the predominant

cell type. The mean pl SD of absolute and percentages of each cell type were as follows: PMN leucocytes 5518 pl 3600 cells/ol and 68 pl 19%, monocytes/macrophages 1600 pl 1120 cells/ol and 26 pl 17%, lymphocytes 830 pl 140 cells/ol and 8 pl 7%, and red blood cell 350 pl 130 cells/ol. The mean pl SD of total protein concentration was 3.5 pl 1 g/dl (range 2.5-5 g/dl). The most commonly isolated bacteria were non-haemolytic streptococci spp., followed by Arcanobacterium pyogenes and *Staphylococcus aureus*. No bacterial growth was obtained in eight samples and non-revealed *Mycoplasma* spp.
Descriptors: dromedarycamels, males,young animals, laneness, swollen joints, synovial fluid; arthritis, joints (animal), neutrophils, Streptococcaceae, bacterial infections, *Arcanobacterium pyogenes*, *Staphylococcus aureus*, plate count.

Baserisalehi, M; Bahador, N; Kapadnis, BP. **Isolation and characterization of *Campylobacter* spp. from domestic animals and poultry in south of Iran.** *Pakistan Journal of Biological Sciences.* 2007; 10(9): 1519-1524. ISSN: 1028-8880
URL: http://www.ansinet.org/pjbs
Abstract: A total of 455 domestic animals (cow, horse and camel) and poultry from south of Iran were surveyed for faecal carriage of *Campylobacter* spp. Out of all collected faecal samples, the highest isolation rate of *Campylobacter* was recorded among poultry (35%), followed by horse (27%) and cow (21%) while, lowest isolation rate was recorded among camel. Of the 85 *Campylobacter* strains isolated, 76 were classified as catalase positive *Campylobacter*. Out of them, high frequency of occurrence was belonged to *Campy. jejuni*. Furthermore, catalase positive *Campylobacter* spp. were isolated from all the sources of investigation, other than camel. The results obtained from biotyping of the isolates indicated *Camp. lari* biotype I followed *by Camp. jejuni* and *Camp. coli* biotypes I existed in high frequency; while *Camp. jejuni* biotype II and untypable *Campylobacter* existed in low frequency. Overall, domestic animals and poultry other than camels are vehicle of *Campylobacter* in the area of investigation therefore, the people who living in this area may be infected via faeces of domestic animals and poultry.
Descriptors: camels, domesticated birds, poultry, horses, cows, *Campylobacter*, *Campylobacter coli*, *Campylobacter jejuni*, catalase, characterization, domestic animals, feces sampling, infection, zoonotic potential, Iran.

Dedet, JP. **Les decouvertes d'Edmond SERGENT sur la transmission vectorielle des agents de certaines maladies infectieuses humaines et animales. [Edmond Sergent's discoveries on the vectorial transmission of agents of human and animal infectious diseases.]** *Bulletin de la Societe de Pathologie Exotique.* 2007; 100(2): 147-150. ISSN: 0037-9085. Note: In French with an English summary.
URL: http://www.pathexo.fr
Abstract: Edmond Sergent has been head of the Institut Pasteur in Algeria during 1910-63, and during those years, carried out an impressive scientific research and studied a lot of agents responsible for human, animal and plant diseases. In the field of vectorial transmission of infectious diseases, he made two essential discoveries: the transmission of cosmopolitan relapsing fever by human body louse in 1908, a year before Charles Nicolle discovered the transmission of the classical exanthematic typhus by the same insect, and the transmission of cutaneous leishmaniasis by the phlebotomine sandfly. Moreover, he made other discover-

ies in similar fields, such as the transmission of dromedary trypanosomiasis by Tabanids, and later by *Stomoxys calcitrans*, and the transmission of the pigeon *Haemoproteus* by *Lynchia maura*. Finally, he described the transmission of *Theileria dispar* (now *T. annulata*) by the tick *Hyalomma mauritanicum* (1928). Reproduced with permission of CAB.

Descriptors: Edmond Sergent, Insitut Pasteur, early researcher, animal and human diseases, medical entomologist, veterinary entomology, disease transmission, disease vectors, vector borne diseases, cutaneous leishmaniasis, louse borne typhus, protozoal infections, trypanosomiasis, dromedary camels, pigeons, *Haemoproteus*, *Hyalomma*, *Leishmania,* Phlebotominae, *Pseudolynchia canariensis*, *Rickettsia prowazekii*, *Stomoxys calcitrans,* Tabanidae, *Theileria annulata*, *Trypanosoma*, *Hyalomma mauritanicum*, *Lynchia maura*.

Ebrahimi, A; Hosseinpour, F; Montazeri, B. **Seroprevalence of brucellosis in dromedaries in Iran.** *Journal of Camel Practice and Research.* 2007; 14(1): 43-44. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The prevalence of brucellosis in slaughtered dromedaries in Najafabad, Iran, was determined by serological examination of 18 female and 135 male serum samples using rose Bengal (RBT), tube agglutination (TAT) and mercaptoethanol (MET) tests in 2006. It was shown that RBT, TAT and MET recorded 1.3, 3.9 and 2.6% reactors, respectively. These results confirm the presence of brucellosis in camels in Iran. Reproduced with permission of CAB.

Descriptors: dromedary camels, agglutination tests, brucellosis, *Brucella*, disease prevalence, disease surveys, epidemiological surveys, epidemiology, Rose Bengal, serological surveys, seroprevalence, Iran.

Foster, A; Jackson, A; D'Alterio, GL. **Skin diseases of South American camelids.** *In Practice.* 2007; 29(4): 216-223. ISSN: 0263-841X

URL: http://www.bvapublications.com

Abstract: Camelids, and alpacas in particular, are growing in popularity in the UK. These animals often present with skin disease and provide a diagnostic and therapeutic challenge for the veterinary clinician. While much has been made about the role of nutritional problems related to zinc, dermatological problems in these species are frequently associated with chronic infestation with Chorioptes mites. The use of macrocyclic lactones and other products may readily treat infestations with other ectoparasites, such as Psoroptes and Sarcoptes mites, but these agents may have to be administered repeatedly to reduce the population of Chorioptes mites. This article describes the most common ectoparasitic conditions seen in South American camelids in the UK as well as some less common problems associated with nutrition, infections, neoplasia and immune-mediated disease, and discusses an approach to the diagnosis and management of skin disease in these species. Reproduced with permission of CAB.

Descriptors: dromedary camels, skin diseases, skin parasites, autoimmune diseases, bacterial diseases, ectoparasites, ectoparasiticides, fungal diseases, infestation, metabolic disorders, fungi, neoplasms, parasitoses, scabies, *Sarcoptes,* cancers, diagnosis, treatment, *Chorioptes*, *Psoroptes*, United Kingdom, South America.

Fouda, TA; Al Mujalii, AM. **Pneumo-enteritis in Arabian camel-calves (*Camelus dromedarius*): clinical and laboratory investigations.** *Journal of Camel Practice and Research.* 2007; 14(2): 119-124. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Seventeen diseased Arabian camel calves (*Camelus dromedarius*), 1-3 months of age in addition to the 5 more apparently healthy calves have been involved in this study. The selected animals were admitted with varying clinical disease conditions, but all had general history of diarrhoea, inappetence and poor body conditions. Based on the results of clinical and laboratory examinations, the diarrhoeic calves were allotted into 2 groups; Group (1) involved calves with bacterial diarrhoea and respiratory manifestations, while group (2) included diarrhoeic calves because of protozoal infestations. Blood samples for complete blood counts and biochemical analysis were obtained from all diseased and healthy calves. In addition, rectal as well as nasal swabs and faecal samples were also obtained from the diseased calves and were subjected to bacteriological and parasitological examinations. The most prominent clinical signs among diseased calves were profuse watery, yellowish diarrhoea with offensive smell, elevated rectal temperatures and respiratory distress, varying degrees of dehydration, poor body conditions and reluctant to suckling their dams. Bacteriological examination revealed that *E. coli* and *Proteus* spp. was the incriminated micro-organism causing diarrhoea and *Staph. aureus* was the causative agent of respiratory troubles in diseased calves of group (1), while parasitic examination indicated that *Eimeria* spp. and *Balantidium coli* were responsible for diarrhoea in calves of group (2). The obtained results of haemogram revealed significant increase in the mean values of total leucocytic counts and packed cell volume in diseased calves with either bacterial or parasitic diarrhoea if compared with their values in healthy control calves. Differential leucocytic counts showed varying patterns as in the diarrhoeic calves with *E. coli* and *Proteus* infections. There is neutrophilia, while those calves with parasitic diarrhoea had eosinophilia. Biochemical analysis of blood sera samples revealed significant elevation in the mean values of potassium and blood urea nitrogen with significant reduction in the mean values of total proteins, albumin, sodium and chloride in the diarrhoeic calves of both groups if compared with their values in the healthy control group. The diseased calves showed varying response to the treatment protocols with gradual improvement within 2 weeks. Reproduced with permission of CAB.

Descriptors: dromedary camels, etiology, bacterial diseases, protozoal infections *Balantidium coli*, *Eimeria*, *Escherichia coli*, *Proteus*, *Staphylococcus aureus*, clinical aspects, diarrhea, respiratory diseases, intestinal diseases.

Gahlot, TK; Jhirwal, SK; Bishnoi, P; Sakar Palecha; Purohit, S. **Radical mastectomy in dromedary camels: case report.** *Journal of Camel Practice and Research.* 2007; 14(1): 39-40. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Descriptors: dromedary camels, mammary gland disease, mastitis, clinical aspects, mastectomy, surgical procedure, post surgical care, case report, India.

Gahlot, TK (Editor). ***Proceedings of the International Camel Conference "Recent trends in Camelids research and Future strategies for saving Camels", Rajasthan, India, 16-17 February 2007.*** published by Rajasthan, India: College of Veterinary & Animal Science.

2007; iii + 226 pp.
Abstract: A total of 78 papers presented at the International Camel Conference are included in this supplement. The topics discussed include disease diagnosis and treatment, breeding and genetics, immunology, microbiology, reproduction, ethnoveterinary practice, camel husbandry, management practices, nutrition, surgery, anatomy, physiology, pharmacology, milk, draft power, production and parasitology. Reproduced with permission of CAB.
Descriptors: Bactrian camels, dromedary camels, camel milk, anatomy, breeding camel diseases, camel husbandry, nutrition, physiology, bacterial diseases, diagnosis, draft animals, genetics, immunology, parasitology, parasitoses, pharmacology, therapeutics, viral infections, reproduction, surgery, therapy, veterinary practice, viral diseases, working animals.

Gahlot, TK. **Lameness in camels.** In:TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 166-167.
Abstract: The lameness in 256 camels was diagnosed in a period of 2 years, i.e. 2003-2005. The basis of diagnosis of lameness was precise history, clinical signs and diagnostic tools. The animals were observed in standing position from front, sides and rear positions. The supportive, swinging or complementary type of lameness was also observed. Camels were viewed during progression in a straight line, in a circle (clock and anticlock wise) and by observing gait on sandy, pebbled or hard tracks. Camels were viewed from the side and rear positions while sitting. Anterioposterior (AP), posterioanterior (PA) or lateral radiographic views were taken. Bovine hoof tester was used to detect the point of entry of foreign body in punctured foot cases. The lameness was diagnosed in 256 camels out of which 116 were diagnosed in forelimb and 140 were diagnosed in hind limbs. In forelimb the highest incidence of affection was punctured foot (43.1%) followed by myositis and spasm of pectoral muscles (21.55%), fracture of metacarpus (6.03%), fracture of humerus and phalanges (3.44%, each) and fistulous tracts at scapular region and fractured carpal bones (2.5%, each). In hind limb, the surgical affections found highest were hock joint arthritis (32.14%), followed by punctured foot (17.85%), upward fixation of patella (10.71%), fracture of tarsal bone (5.71%), fracture of metatarsus, thoroughpin and fracture of phalanges (3.57%, each), spinal concussion, kumri, arthritis of fetlock (2.85%, each), hip joint dislocation, fracture of tibia and popliteal lymph node abscess (2.14%, each). In animals of present study the incidence of lameness was found more in hind leg. The fracture of long bones was primarily due to external trauma, caused by automobile accident, or falling of camel with a loaded cart. The phalangeal fractures occurred due to catching of foot in a ditch or depression where as carpal or tarsal fracture occurred due to sudden turning or twisting of the leg. Reproduced with permission of CAB.
Descriptors: dromedary camels, abscesses, arthritis, bone fractures, clinical aspects, diagnosis, dislocations, lameness, limb bones, myositis, spasms, trauma, clinical picture, India.

Glucks, IV. ***The Prevalence of Bacterial and Protozoal Intestinal Pathogens in Suckling Camel Calves in Northern Kenya.*** Published by Freie Universitat Berlin, Berlin Germany. 2007; v + 122 pp. Note: In English with a German summary. A thesis.
Abstract: The prevalence of bacterial and protozoal agents in dromedary camel calves up to 12 weeks of age was studied in northern Kenya during 2002-2004. A higher percent-

age of 229 camels with diarrhoea was found in the pastoralist herds (31.9%) compared to the ranch herds (19.2%). Diarrhoea peaked at 2-3 weeks of age in both systems. A total of 6.6% of 197 camels were shedding *Isospora orlovi* and *Strongyloides* spp., while 4.6% were shedding *Strongylus* sp. eggs. These parasites were higher in the pastoralist herds. *Klebsiella pneumoniae* was isolated in 119 (26.9%) of camel calves, while *Salmonella* sp. and *Escherichia coli* were found in 226 (19.1%) and 200 (97.5%) camels, respectively. The point prevalences of *K. pneumoniae* and *Salmonella* sp. were higher at 3 weeks of age. No *K. pneumoniae* was isolated in animals older than 6 weeks, while Salmonella was present until 12 weeks. *E. coli* was constantly present in all age groups. There was no difference in point prevalences in *K. pneumoniae* and *Salmonella* sp. between pastoralist and ranch systems. Analysis of camels without (Category A) and with diarrhoea (Category B) showed that *Strongylus* and *Strongyloides* spp. were present in both groups but were higher in Category B, while *I. orlovi* sp. was only present in Category B. *K. pneumoniae* was more prevalent in camels at 10 weeks of age and were less common in older animals. There was a higher prevalence of infection in Category B (25.3%) than in Category A (12.5%). *Salmonella* was high at 2 weeks of age and then decreased. It was also higher in Category B (43.6%) compared to a A (22.7%). *E. coli* was found in both categories at different ages. 62.9% of the 62 *K. pneumoniae* isolates were found in diarrhoeic or dead camels. *S. bovismorbificans* was the most common serotype (32.6%) followed by *S. butantan* (21.5%), *S. typhimurium* (11.1%), *S. kiambu* (9.0%) and *S. muenchen* (7.6%). *S. typhimurium* and *S. adelaide* were found in both management systems. Only *S. typhimurium* was commonly associated with disease (81%). Virulence-associated genes were detected in 78 *E. coli* isolates in healthy, diarhhoeic and recovering camels, while none were found in dead animals. There was no indication that *E. coli* has a significant role in the diarrhoea complex of camel calves up to 12 weeks of age. Reproduced with permission from CAB.

Descriptors: dromedary camels, age differences, bacterial infectious diseases, diarrhea, disease prevalence, disease surveys, epidemiological surveys, epidemiology, farming systems, mortality, nematode infections, pastoralism, protozoal infections, ranching, virulence, *Escherichia coli*, *Isospora orlovi*, *Klebsiella pneumoniae*, *Salmonella typhimurium*, *Strongyloides*, *Strongylus*, *Rhabditida*, *Salmonella adelaide*, *Salmonella bovismorbificans*, *Salmonella butantan*, *Salmonella kiambu*, *Salmonella muenchen*, *Secernentea*, Kenya.

Ismail, ZB; Al Rukibat, R; Al Tarazi, Y; Al Zghoul, MB. **Synovial fluid analysis and bacterial findings in arthritic joints of juvenile male camel (*Camelus dromedarius*) calves.** *Journal of Veterinary Medicine Series A*. 2007; 54(2): 66-69. ISSN: 0931-184X

DOI: http://dx.doi.org/10.1111/j.1439-0442.2007.00889.x

Abstract: Eighteen synovial fluid samples from 11 male dromedarian calves, 9-12 month old, were analysed cytologically and bacteriologically. Calves were lame and all joints were grossly swollen. The mean+or-SD of total nucleated cell count was 7970+or-5000 cells/ micro l (range 2800-20 000 cells/ micro l). Polymorphonuclear (PMN) leucocytes were the predominant cell type. The mean+or-SD of absolute and percentages of each cell type were as follows: PMN leucocytes 5518+or-3600 cells/ micro l and 68+or-19%, monocytes/ macrophages 1600+or-1120 cells/ micro l and 26+or-17%, lymphocytes 830+or-140 cells/ micro l and 8+or-7%, and red blood cell 350+or-130 cells/ micro l. The mean+or-SD of total protein concentration was 3.5+or-1 g/dl (range 2.5-5 g/dl). The most commonly isolated

bacteria were non-haemolytic streptococci spp., followed by *Arcanobacterium pyogenes* and *Staphylococcus aureus*. No bacterial growth was obtained in eight samples and non-revealed *Mycoplasma* spp. Reproduced with permission of CAB.
Descriptors: dromedary camels, arthritis, clinical aspects, diagnosis, joint diseases, lameness, synovial fluid, *Arcanobacterium pyogenes*, *Staphylococcus aureus*, *Streptococcus*, arthropathy, clinical picture.

Khorasgani, MR; Salehi, TZ; Khormali, M; Moallemzadeh, SA. **Seroprevalence of *Salmonella* infections in camels at Qum, Iran.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 23-24.
Abstract: In this survey, for evaluation of the abundance of *Salmonella* infections in camels in Qum (one of the central regions of IRAN), 110 sera samples were obtained from camels at slaughter-house and examined with Widal test for diagnosis of anti-*Salmonella* antibodies. The 21% of sera samples were positive in Widal tests against B antigen (O group) with different titres from 1/20 to 1/80. The 27% of sera samples were positive in Widal tests against D antigen (O group) with different titres from 1/20 to 1/320. The 9 sera samples were positive in Widal tests against B & D antigens together. Reproduced with permission of CAB.
Descriptors: camels, antibodies, antibody testing, bacterial antigens, diagnosis, disease prevalence, disease surveys, epidemiological surveys, epidemiology, *Salmonella,* salmonellosis, serological surveys, seroprevalence, antibody detection, antibody tests, disease surveillance, *Salmonella* infections, seroepidemiology, Iran.

Mazyad, SAM; Hafez, AO. **Q fever (*Coxiella burnetii*) among man and farm animals in North Sinai, Egypt.** *Journal of the Egyptian Society of Parasitology.* 2007; 37(1): 135-142. ISSN: 1110-0583
Abstract: Antibodies against *Coxiella burnetii* were estimated among sheep, goats and camels (190), their owners (150 patients with pyrexia of unknown origin) and 30 normal individuals in North Sinai, Egypt during 2006 by indirect immunofluorescence assay. Nested polymerase chain reaction was used to detect Com-1 gene (genetic target of *C. burnetii*) encoding a 27 kDa outer membrane protein in the samples. *C. burnetii* IFA antibodies (IgM and IgG) in patients were 8 (5.3%) and a healthy control (3.3%). The overall was 9 of 180 (5.0%). *C. burnetii* IgM were detected in 3/150 (2%) patients with positive genome, while IgG were detected in 5/150 patients, only the 3 who had IgM and IgG had positive genome suffered high fever. *C. burnetii* antibodies were detected in 20 (22.5%), 12 (16.8%) and 4 (13.3%) of sheep, goats and camels, which totalled 36/190 (18.9%). The positive genome of these IFA positive animals was 10 (50.0%), 4 (33.3%) and zero (0.0%), respectively. On the other hand, *Rhipicephalus sanguineus* (dog tick) and *Dermacentor andersoni* (wood tick) were identified on some Q fever infected animals. Reproduced with permission of CAB.
Descriptors: camels, goats, humans, sheep, abattoir fever, Balkan grippe, Derrick Burnet disease, Nine Mile fever, PCR, pneumorickettsiosis, pyrexia, quadrilateral fever, query fever, antibodies, fever, genes, genotypes, human diseases, IgG, IgM, immunoassay, Q fever, *Coxiella burnetii,Dermacentor andersoni*, *Rhipicephalus sanguineus*, Egypt.

Mazyad, Said AM; Hafez, Adel Omar. **Q fever (*Coxlella burnetii*) among man and farm animals in North Sinai, Egypt**. *Journal of the Egyptian Society of Parasitology.* 2007; 37(1): 135-142. ISSN: 1110-0583

Descriptors: sheep, goats, camels, humans, zoonotic pathogen, pyrexia, *Coxiella burnetii*, antibody testing for Q fever, nested PCR, Com-1gene encoding 27-kDA membrane protein, IFA antibodies, *Rhipicephalus sanguineus* (dog tick), *Dermacentor andersoni* (wood tick) on some Q fever infected animals, Sinai, Egypt.

Mohamed, MM. **Molecular characterization and immunogentic properties of a group 3 membrane protein isolated from *B. abortus* infection.** *Journal of Biological Sciences.* 2007; 7(7): 1046-1059. ISSN: 1727-3048

Abstract: This study was conducted to evaluate the immunogenicity and protective efficacy of *B. abortus* protein antigen. A gene that encode 0.85 kbp was isolated from *B. abortus* genome lambda gt11 expression library by probing with a Polled Human Abs (PHAbs) infected with *B. abortus* or *B. melitensis*. Sequence analysis of the cloned gene revealed the presence of an Open Reading Frame (ORF) of 259 amino acids encoding for a protein with calculated molecular weight of 23 kDa (Bp23). The predicted amino acid sequences of this gene shows 83% similarity with *B. abortus* outer membrane 26 kDa protein (Omp26) previously sequenced. The recombinant *B. abortus* protein was identified by human sera infected with either *B. abortus* or *B. melitensis*, but not healthy persons as shown by Western blotting. Therefore, the availability of this recombinant protein and the identification of the antigenic determinant recognized by human Ab will allow the evaluation of its potential protective activity for the development of subcellular vaccines against brucellosis. Moreover, the use of this recombinant protein in Western blotting allowed differentiation between vaccinated from naturally infected camels. Hyperimmune rabbit serum against Bp23 recombinant protein could detect naturally infected animals with different specificities, whereas represented in camels (100%), cows (54%) and sheep (33%), but not detected at all in brucellosis free camels. These data indicated that the new isolated Bp23 recombinant protein might be of value as a vaccine candidate for treatment of human brucellosis and as an antigen for serological diagnosis of brucellosis in different animals as well.

Descriptors: dromedary camels, bacterial antigens, serodiagnosis of brucellosis, genes, genome analysis, genomes, zoonotic human diseases, nucleotide sequences, zoonoses, *Brucella abortus*.

Omer, MM; Abdelaziz, AA; Abusalab, SMA; Ahmed, AM. **Survey of brucellosis among sheep, goats, camels and cattle in Kassala area, Eastern Sudan.** *Journal of Animal and Veterinary Advances.* 2007; 6(5): 635-637. ISSN: 1680-5593

Abstracts: The study is conducted to estimate the prevalence of brucellosis in different animals species in Kassala area, eastern Sudan from 2004 to 2006. The study aimed to provide information on the prevalence of the disease to assist veterinary authorities in diseases control policies and planning research priorities in the region. Serum samples were collected from sheep, goats, camels and cattle, and then tested using Rose Bengal Plate test. The study showed that the prevalence of brucellosis for all species increased within the studied years.

Descriptors: cattle, dromedary camels, goats, sheep, *Brucella* infection, brucellosis, disease distribution, disease prevalence, disease surveys, epidemiology, Sudan.

Probst, C; Speck, S; Hofer, H. **Epidemiology of selected infectious diseases in zoo-ungulates: single species versus mixed species exhibits.** In:G Wibbelt; N Bergholz; S Seet; H Hofer (Editors) *Proceedings of the Institute for Zoo and Wildlife Research, Berlin.* 2007; (7): 10-12. ISSN: 1431-7338. Note: Erkrankungen der Zootiere. Verhandlungsbericht des 43. Internationalen Symposiums uber die Erkrankungen der Zoo und Wildtiere, Edinburgh, UK, 19-20 May, 2007.

URL: http://www.izw-berlin.de

Abstract : A total of 926 ungulates of the three families of Bovids, Cervids, and Camelids from one Czech and ten German zoos were tested for antibodies against selected infectious agents that can be transmitted interspecifically. The relationship between taxonomy and exhibit type (single species/mixed species exhibit) and seroprevalence was examined. The highest seroprevalence (21.2%) was found against malignant catarrhal fever (MCFV). Especially Bovids (24.5%) and animals of petting zoos (60.6%) were seropositive. Reproduced with permission of CAB

Descriptors: bovines, dromedary camels, cervids, ungulates, zoo animals, disease prevalence, disease surveys, disease transmission, ELISA, antibodies, epidemiology, malignant catarrhal fever, serology, seroprevalence, virus neutralization, bovine diarrhea virus, bovine herpesviruses, caprine herpesvirus 1, *Coxiella burnetii*, *Mycobacterium avium* subsp *paratuberculosis,* catarrhal fever, gangrenous coryza, malignant catarrh, mucosal disease virus, Germany.

Shuchismita-Chatterjee; Kashyap, SK; Ghorui, SK. **Resistotyping of different *Escherichia coli* isolates of livestock and poultry.** *Indian Journal of Animal Sciences.* 2007; 77(2): 163-166. ISSN: 0367-8318

Abstract: This study was undertaken to discriminate *Escherichia coli* strains based on their susceptibility or resistance to antibiotics. 100 strains of *E. coli* isolated from cattle, camels, sheep and poultry were used in this study. Most of the isolates from camels, cattle, sheep and poultry were sensitive to gentamicin, chloramphenicol and streptomycin but resistant to ampicillin and trimethoprim. A marked degree of heterogenicity was observed in the sensitivity pattern to kanamycin, tetracycline and doxycycline. No difference in the resistance pattern of *E. coli* isolates of different host species belonging to similar O serogroups was observed. The results might help in deriving the clonal relationship between different strains of *E. coli* from camel, cattle, sheep and poultry. Reproduced with permission of CAB.

Descriptors: livestock, dromedary camels, cattle, sheep, domesticated birds, poultry, *Escherichia coli*, strains, ampicillin, chloramphenicol, doxycycline, drug resistance, gentamicin, kanamycin, streptomycin, tetracycline, trimethoprim, achromycin.

Wernery, U; Kinne, J; Joseph, M; Johnson, B; Nagy, P. **Where do *Brucella* organisms hide in serologically positive lactating dromedaries?** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 68-70.

Abstract: Three 8-12 year old milking dromedaries were tested serologically positive several times for brucellosis with the RBT, SAT and CFT over a period of 4 months. One animal excreted the *Brucella* organisms in low numbers through the milk. It was decided to euthanise all 3 animals. All 3 camels had delivered healthy male calves 3 months earlier and the dams themselves were in very good bodily condition. After euthanasia, a thorough bac-

teriological and histological investigation of all organs, lymph nodes, joints and milk was carried out. Special attention was directed towards the mammary glands and adjacent lymph nodes, as well as, towards the reproductive tract. For the isolation of brucella microorganisms, a routine and a concentration method were applied. *Brucella melitensis*, serovar 3 was isolated from all 3 dromedaries. Histopathological investigations showed no lesions in any of the organs except in lymph nodes, from which *B. melitensis* was isolated. The lymph nodes showed marked sinusoidal oedema, activated follicles and histiocytosis. None of the 3 camels harboured *Brucella* bacteria in their reproductive tracts or adjacent lymph nodes. From only one dromedary, which excreted *B. melitensis* through the milk, were *Brucella* organisms isolated, from the right and left udder cisterns. *B. melitensis* bacteria were isolated from *Lnn cervicales superficiales* in all 3 cases and from other different lymph nodes, but not in all 3 cases. The concentration method is essential for the recovering of *Brucella* organisms from organs and milk. Reproduced with permission of CAB.
Descriptors: dromedary camels,camel milk, brucellosis, histopathology, lymph nodes, mammary glands, seroprevalence, *Brucella melitensis,* Dubai.

Wernery, U; Kinne, J. **An approach to the diagnosis of camel diseases: clinical pathology and post-mortem criteria.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 19-22.
Abstract: The most important camel diseases are systematically presented. The presentation starts with skin diseases, including camelpox, orf, dermatophilosis, pseudotuberculosis, mange and others, followed by internal diseases. They include systemic diseases like anthrax, endotoxicosis and organ diseases like tuberculosis, paratuberculosis, melioidosis, tetanus, rickettsiosis, colibacillosis, FMD, mycotic diseases and some diseases caused by deficiencies or toxins. The diseases are explained with the help of pictures, including histological explanations from diseased camels or their altered organs. Special effort has been made to include a differential diagnosis for each disease. Reproduced with permission of CAB.
Descriptors: camels, important camel diseases, etiology, animal pathology, camelpox, orf, dermatophilosis, pseudotuberculosis, anthrax, endotoxicosis, tuberculosis, paratuberculosis, melioidosis, tetanus, rickettsiosis, colibacillosis, FMD, mycotic diseases, mange, deficiences, toxins, clinical aspects, diagnosis, differential diagnosis, histopathology, photographic illustration of diseases, postmortem examinations, post mortem sampling, clinical picture.

Wernery, U; Kinne, J; Jahans, KL; Vordermeier, HM; Esfandiari, J; Greenwald, R; Johnson, B; Ul Haq, A; Lyashchenko, KP. **Tuberculosis outbreak in a dromedary racing herd and rapid serological detection of infected camels**. *Veterinary Microbiology*. 2007 May 16; 122(1-2): 108-115. ISSN: 0378-1135
DOI: http://dx.doi.org/10.1016/j.vetmic.2007.01.012
NAL call no: SF601.V44
Abstract: A recent outbreak of tuberculosis (TB) in a dromedary racing herd of 58 animals involved 3 infected animals. Disease was confirmed at necropsy by finding gross lesions from which *Mycobacterium bovis* (antelope type) was isolated. Sera collected from the camels in this herd were used to evaluate two new serological methods, Multiantigen Print Immunoassay (MAPIA) and rapid test (RT) developed using the lateral-flow technology, in comparison

with the intradermal tuberculin tests. Antibodies were found in all three infected dromedaries by both RT and MAPIA, but not in the remaining 55 animals in the herd. With the limited number of animals tested in this study, the serological assays showed the potential for convenient, rapid, and accurate diagnosis of TB in live camels.
Descriptors: dromedary camels, racing animals, animal diseases, tuberculosis, *Mycobacterium bovis*, disease outbreaks, disease detection, rapid test methods, new methods, multiantigen print immunoassay, serodiagnosis, antibody detection.

Younan, M; Gluecks, IV. ***Clostridium perfringens* type B enterotoxaemia in a Kenyan camel.** *Journal of Camel Practice and Research.* 2007; 14(1): 65-67. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: *Clostridium perfringens* toxin type B was isolated from the small intestine of a 2-year-old weaned camel calf (*Camelus dromedarius*) in North Kenya that had died from severe haemorrhagic enteritis [date not given]. The case occurred at the end of the dry season after early onset of the long rains in a pasture area heavily stocked with sheep. *C. perfringens* toxin type B was not found in faecal samples from 7 cohort animals in the same herd and from 30 age mates on the same pasture or in the same district. Sheep cannot be ruled out as a possible source of this infection.
Descriptors: dromedary camels, young camel, sheep, hemorrhagic enteritis, *Clostridium perfringens*, bacterial toxins, enterotoxemia, diagnosis, case reports, clinical aspects, Kenya.

Younan, M; Bornstein, S; Gluecks, IV. **Peri-articular abscesses in camel calves in North Kenya.** *Journal of Camel Practice and Research.* 2007; 14(2): 161-164. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Fourty-nine cases of peri-articular abscesses were examined in camel calves in North Kenya aged 16 days to 9 months. Abscesses were located around the elbow (33.3%), tarsus (29.2%), carpus (25.0%), knee (8.3%) and fetlock (4.2%) joints. *Streptococcus agalactiae* was isolated from 82% of cases, including from all fatal cases. A mixed infection *of Streptococcus agalactiae* and *Streptococcus equi zooepidemicus* was found in two cases (4%), while a mucoid *Streptococcus equi zooepidemicus* was isolated from one case (2%). There was quick response to antibiotic treatment in fresh cases (n=10), but healing was protracted over several months in untreated cases. Chronic multiple peri-articular abscesses were fatal in 5 of the 49 camel calves seen (10% mortality). None of the 49 cases showed evidence of omphalophlebitis. Reproduced with permission of CAB.
Descriptors: dromedary camels, calves, peri-articular abscesses, causal agents, *Streptococcus agalactiae*, *Streptococcus equi* subsp *zooepidemicus,* etiology, bacterial infections, disease prevalence, epidemiology, omphalitis, umbilicus, omphalophlebitis, Kenya.

Younan, M; Bornstein, S. **Lancefield group B and C streptococci in East African camels (*Camelus dromedarius).*** *Veterinary Record.* 2007; 160(10): 330-335. ISSN: 0042-4900
NAL call no: 41.8 V641
Abstract: Seventeen Lancefield group C streptococci (13 *Streptococcus equi zooepidemicus* and four *Streptococcus dysgalactiae equisimilis*) and 185 Lancefield group B streptococci (*Streptococcus agalactiae*) were isolated from camels (*Camelus dromedarius*) in Kenya and Somalia; 59 of the isolates were from healthy nasopharynx, vaginal and rectal mucosa and from

non-abscessed lymph nodes, and the other 143 isolates were from clinical infections of the respiratory tract, tick bite lesions, abscessed lymph nodes, abscesses and other purulent skin lesions, periarthritis and arthritis, puerperal infection and gingivitis. The role of Lancefield group B and C streptococci as commensals and common opportunistic pathogens in East African camels is described. Reproduced with permission of CAB.
Descriptors: dromedary camels, abscesses, arthritis, genital system diseases, gum disease, gingivitis, lung diseases, respiratory diseases, disease prevalence, disease surveys, epidemiology, intestinal mucosa, lymph nodes, pharynx, rectum, skin lesions, tick bites, vaginal diseases, *Streptococcus agalactiae*, *Streptococcus dysgalactiae* subsp *equisimilis*, *Streptococcus equi* subsp *zooepidemicus,* Kenya, Somalia.

2006

Abdurahman, OAS. **Udder health and milk quality among camels in the Errer valley of eastern Ethiopia.** *Livestock Research for Rural Development.* 2006; 18(8): 110. ISSN: 0121-3784
Abstract: Quarter milk samples (n=205) from 53 camels were examined to study the occurrence and causes of mastitis in traditionally managed camels in the Errer valley of eastern Ethiopia and to observe factors affecting udder health. The study revealed tick infestation and lesions on the teats and udder skin 26 (49,1%). Seven (3.3%) camels had blind teats and 5(9.4%) had clinical mastitis. Seventy-seven (37.6%) quarters yielded bacteria. *Staphylococcus aureus*, *Streptococcus agalactiae* and coagulase negative staphylococci were the main organisms isolated. A high proportion (80%) of bacteria positive milk samples had CMT score 2 or more, while a similar proportion (80%) of bacteriologically negative samples showed CMT score 1. Quarters infected with bacteria had significantly higher mean values for somatic cell counts than non-Infected ones log 12.5 and 13.6 respectively. The demographic parameters of age, parity, and lactation stage did not influence the ability to predict whether a quarter was normal, when judged on percentage correctly classified. The significance of the findings in relation to production system, hygiene and public health aspects were discussed. It is concluded that early problem recognition and improved hygienic measures will result in reduced losses due to mastitis and increase the availability of milk for consumption and sale.
Descriptors: dromedary camels, camel milk, mastitis, disease prevalence, disease surveys, California mastitis test, epidemiological surveys, epidemiology, microbial contamination of milk, milk hygiene, milk quality, somatic cell count, *Staphylococcus aureus*, *Streptococcus agalactiae,* Abyssinia, Ethiopia.

Agab, H. **Diseases and causes of mortality in a camel (*Camelus dromedarius*) dairy farm in Saudi Arabia.** *Journal of Camel Practice and Research.* 2006; 13(2): 165-169. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The diseases and causes of mortality in intensively kept dromedary camels reported in this study were studied throughout one year (July 2001-June 2002) in a dairy camel farm in Al-Qassim region, central Saudi Arabia. The camel population in the farm at the study period was composed of 2316 adult and weaned calves and 126 suckling calves. 942 camels were affected with one or more disease conditions, giving a crude morbidity rate of 38.6%. The ten most common diseases encountered among the camels of the farm were mange

(22.6%), mastitis (20.9%), camel dermatophilosis (18.7%), Heyam syndrome (trypanosomiasis like sings) (14.5%), skin wounds and abscesses (4.2%), calf diarrhoea (4.1%), diazinon toxicity (3.5%), snake bites (1.9%), respiratory complaints (1.8%) and papillomavirus infection (1.7%). Other diseases encountered included eye affections (1.2%), metritis (1%), uterine prolapse (1%), retained placenta (0.7%), bone fractures (0.6%), urea intoxication (0.5%), abortions (0.5%) and dystocia (0.4%). During the period of study, 180 camels died, giving a crude mortality rate of 7.4%. The most common causes of mortality recorded in the camel farm were due to Heyam syndrome (53.3%), diazinon toxicity (15%), snake bites (10%), calf diarrhoea (8.9%), undiagnosed cases (5%), bone fractures (3.3%), urea intoxication (2.8%), uterine prolapse (1.1%) and dystocia (0.6%).
Descriptors: dromedary camels, abortion, camel diseases, *Dermatophilus*, papillomavirus, *Trypanosoma,* disease prevalence, disease surveys, epidemiological surveys, epidemiology, abscesses, etiology, bone fractures, causes of death, diarrhea, dystocia, endometritis, uterine prolapse, placental retention, eye diseases, mastitis, respiratory diseases, skin diseases, snake bites, milk production, morbidity, mortality, poisoning, diazinon, toxicity, wounds, Saudi Arabia.

Al Tarazi, YH; Elsheikh, H. **In vitro sensitivity against bacterial pathogens isolated from pneumonic lungs of camels in Jordan.** *Journal of Camel Practice and Research.* 2006; 13(2): 157-163. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Antimicrobial resistance to 15 antimicrobials (penicillin, ampicillin, amoxicillin, tetracycline, doxycycline, streptomycin, gentamicin, neomycin, enrofloxacin, ciprofloxacin, flumequine, lincomycin, erythromycin, colistin sulfate and co-trimoxazole) were determined in vitro for 20 *Escherichia coli*, 11 *Klebsiella* spp., 11 *Staphylococcus* spp., 9 *Pseudomonas aeruginosa,* 5 *Arcanobacterium pyogenes*, 5 *Mannheimia haemolytica* and 4 *Streptococcus* spp. incriminated as the causative agents of pneumonia of camels in Jordan during July 2000-February 2001. Susceptibility was determined qualitatively by the agar diffusion method. The minimum inhibitory concentration (MIC) and the minimum bactericidal concentration (MBC) values of 5 antimicrobials were determined by the microdilution method. The majority of the isolates were most susceptible to ciprofloxacin and enrofloxacin. Only 40 and 60% of the *A. pyogenes* isolates were sensitive to ciprofloxacin and enrofloxacin, respectively. In addition, 18% of *Klebsiella* spp. were resistant to enrofloxacin. Ciprofloxacin minimum inhibitory concentration (MIC< sub>50</ sub>) and minimum bactericidal concentration (MBC) were 0.125 and 0.25 micro g/ml and 0.5 and 1 micro g/ml for *P. aeruginosa* and Staphylococcus aureus, respectively. With the exception of *M. haemolytica* and *A. pyogenes*, more than 82% of the isolates were found to be sensitive to gentamicin, with MIC< sub>50</ sub> and MBC of 0.25 and 0.5 micro g/ml, respectively, for *Staphylococcus aureus* and 1 and 2 micro g/ml for *E. coli* and *Klebsiella* spp., respectively. Flumequine was highly effective against *M. haemolytica* isolates, whereas 15% of *E. coli* isolates were resistant. *Streptococcus* spp. isolates were 100% sensitive to doxycycline, whereas other isolates displayed resistance with 20 and 67% for *M. haemolytica* and *P. aeruginosa*, respectively. The bacterial isolates showed variable resistance between 9-100% to penicillin, ampicillin, amoxicillin, tetracycline, lincomycin, erythromycin, colistin, co-trimoxazole, streptomycin and neomycin. Multiple resistance of 4 and up to 11 different antimicrobials were displayed for *E. coli*, *P.*

aeruginosa and *Klebsiella* spp. and the most common resistance pattern was penicillin, ampicillin, amoxicillin, tetracycline, doxycycline, lincomycin and erythromycin. Ciprofloxacin, enrofloxacin and gentamicin appear to have a great potential to control bacterial respiratory infections in camels, with the appropriate dosages based on pharmacokinetic/pharmacodynamic studies.

Descriptors: dromedary camels, lung infections, pneumonia, respiratory diseases, *Arcanobacterium pyogenes*, *Escherichia coli*, *Klebsiella*, *Pasteurella haemolytica*, *Pseudomonas aeruginosa*, *Staphylococcus*, *Staphylococcus aureus*, *Streptococcus*, *Mannheimia*, *Mannheimia haemolytica*, *Pasteurellales*, bacterial pathogens, antibacterial agents, ampicillin, ciprofloxacin, co-trimoxazole, doxycycline, enrofloxacin, erythromycin, gentamicin, lincomycin, neomycin, penicillins, streptomycin, tetracycline, achromycin, amoxicillin, colistin sulfate, lincocin, epidemiological surveys, epidemiology, multiple drug resistance, susceptibility, drug resistance, Jordan.

Atif, EAG; Hildebrandt, G; Kleer, JN; Molla, B; Kyule, MN; Baumann, MPO. **Comparison of California Mastitis Test (CMT), Somatic Cell Counts (SCC) and bacteriological examinations for detection of camel (*Camelus dromedarius*) mastitis in Ethiopia.** *Berliner und Munchener Tierarztliche Wochenschrift.* 2006; 119(1/2): 45-49. ISSN: 0005-9366. Note: In English with a German summary.

Abstract: The objective of this study was to compare the results of California Mastitis Test (CMT), Somatic Cell Count (SCC) and bacteriological examinations for the detection of udder infections in camels. A total of 956 quarter milk samples from 253 traditionally managed lactating camels were collected aseptically from Negele (Borena Region), Dire Dawa, and Gewane (Afar Region), Ethiopia according to multi-stage sampling. The quarter milk samples were subjected to CMT, SCC and bacteriological examinations. 571 (59.7%) quarter milk samples had microorganisms. Out of the 571 samples, 428 (75.0%) had isolates that were identified as major pathogens (MAP) and 143 (25.0%) as minor pathogens (MIP). A positive correlation was found between CMT scores and bacteriological classes (MAP, MIP) (p-value=0.00). A high correlation (p-value=0.00) was obtained between CMT scores and SCC. The differences among the median log SCC of bacteriological classes (MAP, MIP) were not significant (p-value=0.24). Similarly, the application of the cut-off level of 2.5x105/ml indicated less agreement (p-value=0.32) for bacteriological classes MAP and MIP. It is concluded that CMT can be used for the detection of udder infection in camels, while further investigation is required for the use of SCC as a diagnostic tool for normal and mastitic camel milk.

Descriptors: dromedary camels, camel milk, bacteriology, mastitis, California Mastitis Test, CMT, diagnosis, diagnostic techniques, Somatic Cell Count, SSC, udder quarters, Abyssinia, Ethiopia.

Bani Ismail, Z; Al Rukibat, R. **Synovial fluid cell counts and total protein concentration in clinically normal fetlock joints of young dromedarian camels.** *Journal of Veterinary Medicine—Zentralblatt fur Veterinarmedizin Reihe-A.* 2006 June; 53(5): 263-265. ISSN: 0931-184X

DOI: http://dx.doi.org/10.1111/j.1439-0442.2006.00823.x

NAL call no: 41.8 Z5

Abstract: Twenty-seven 9-12 months old healthy male dromedarian camels were used to determine total nucleated leucocyte count (TNCC), absolute and percentages of polymorphonuclear (PMN) and mononuclear leucocytes, and total protein (TP) concentration in synovial fluid from grossly and radiographically normal fetlock joints. Arthrocentesis was performed bilaterally from the fetlock joints of the forelimbs and hindlimbs. Blood contaminated samples and samples obtained from grossly or radiographically abnormal joints were excluded. The mean +/- SD of TNCC in 108 samples of fetlock joint synovial fluids was 500 +/- 400 cells/(So(Bl. Monocytes/macrophages were the predominant cell type. There were no significant differences in mean TNCC, absolute numbers and percentages of various leucocytes and TP concentrations between the right and left fetlock joints of the forelimbs and hindlimbs or between the fetlock joints of the forelimbs and hindlimbs. The mean +/- SD of absolute numbers and percentages of various cell types were: PMN leucocytes 1 +/- 2 cells/(So(Bl (2%), lymphocytes 116 +/- 167 cells/(So(Bl (26%), and monocytes/macrophages 383 +/- 323 cells/(So(Bl (72%). The mean +/- SD of TP concentration was 2 +/- 1 g/dl.
Descriptors: camels, males, young animals, animal diseases, joint diseases, disease detection, disease diagnosis, joints (animal), synovial fluid, forelimbs, normal values, blood cell counts, leukocyte count, radiography, blood chemistry, macrophages, monocytes, fetlock joint.

Baracco, GJ; Bisno, AL. **Group C and group G streptococcal infections: epidemiologic and clinical aspects.** In: VA Fischetti; RP Novick; JJ Ferretti; DA Portnoy, DA; JI Rood, (Editors). *Gram Oositive Pathogens.* 2006; (Ed.2): 222-229. ISBN: 1555813437; 9781555813437
Abstract: This chapter focuses on the species-based nomenclature of streptococci, particularly groups C and G. The epidemiological and clinical aspects of groups C and G streptococcal infection are discussed. Some studies on Streptococcus dysgalactiae and S. equi infection in man and animals are cited. Treatment options for this infection are also given.
Descriptors: dromedary camels, cattle, cows, sheep, lambs, humans, antibiotics, bacterial diseases, bacterial infections, clinical aspects, drug therapy, epidemiology, cephalosporins, chloramphenicol, erythromycin, penicillins, group C streptococci, group G streptococci, *Streptococcus dysgalactiae* subsp *equisimilis*, *Streptococcus equi* subsp *zooepidemicus*.

Bhardwaj, B; Sharma, GD; Singh, AP; Dadhich, R; Surender Singh. **Incidence and pathology of bronchopneumonia in camel.** *Veterinary Practitioner.* 2006; 7(1): 15-16. ISSN: 0972-4036
Abstract: Involvement of the lungs, whether due to infection of endogenous origin or exposure to contaminated atmosphere through trachea, leads to pneumonia. The lungs of 157 camels in India were examined. Bronchopneumonia was recorded in 3.82% cases. Grossly, the affected lungs showed congestion, oedema and patchy areas of consolidation. On microscopic examination, sections revealed bronchiolitis, areas of red hepatization showing severe congestion and areas of grey hepatization showing alveolar lumina filled with cellular exudate. Reproduced with permission of CAB.
Descriptors: camels, bronchopneumonia, lung diseases, etiology, animal pathology, clinical aspects, disease prevalence, disease surveys, epidemiological surveys, epidemiology, histopathology, pneumonia, causal agents, India.

El Naggar, AL; Amin, MM; Youssef, RR; Mahmoud, MA; El Kattan, A. **Studies on some bacterial infections of camels in Halaieb, Shalateen and Abou-Ramad triangle.** *Veterinary Medical Journal Giza.* 2006; 54(3): 701-714. ISSN: 1110-1423. Note: In English with an Arabic summary.

Abstract: The bacteriological examination of 40 swabs from the nasal discharges of 20 local and 20 imported dromedary camels in Egypt revealed that 37 of them gave 47 bacterial isolates, out of them (25.53%) were Gram positive and the others were Gram negative. The most important identified bacterial spp. were *Staphylococcus aureus* (21.27%), *Staphylococcus epidermidis* (4.25%), *Pseudomonas aeruginosa* (4.25%) and *Escherichia coli* (38.29%). The examination of 40 faecal swabs from 20 local and 20 imported diarrhoeic camels revealed 50 Gram negative bacterial isolates. The most important isolates were *Salmonella* spp. (4%), *E. coli* (42%), *Citrobacter* spp. (24%) and *Klebsiella* spp. (12%). The prevalence of antibodies to *Brucella* spp. was studied serologically among 126 camels (95 local and 31 imported) using 3 different serological methods, namely, rose Bengal plate test (RBPT), serum tube agglutination test (STAT) and ELISA. For local camels, the prevalence rate was 9.47, 5.26 and 9.47%, respectively. The rate was higher in males than in females except by the STAT. Regarding imported camels, the prevalence rate was 6.67, 9.67 and 25.80% using the same tests, respectively. Results were also higher in males than in females except by ELISA.

Descriptors: dromedary camels, prevalence of bacterial diseases, Gram negative bacteria, Gram positive bacteria, agglutination tests, antibodies, antibody testing, bacterial diseases, diarrhea, disease prevalence, disease surveys, ELISA, epidemiological surveys, epidemiology, feces, rose Bengal plate test, serological surveys, sex differences, *Brucella,Citrobacter*, *Escherichia coli*, *Klebsiella*, *Pseudomonas aeruginosa*, *Salmonella*, *Staphylococcus aureus,Staphylococcus epidermidis,* Egypt.

Fahmy, BGA; Zaki, HM. **Serological tests and biochemical profiles in camels infected with brucellosis.** *Veterinary Medical Journal Giza.* 2006; 54(2): 379-403. ISSN: 1110-1423. Note: In English with an Arabic summary.

Abstract. Blood samples were collected from 80 camels kept in a closed farm, and another 72 blood samples were collected from camels kept in close contact with cattle and other small ruminants from different areas in Giza governorate. 94 blood samples were also collected from camel imported from Sudan. The highest percentage of positive reactors was observed in the imported camels (Sudanese camel) in the large herd (8.50-11.70%). The percentages of positive animals based on rose bengal plate test (RBPT), buffered acidified plate antigen test (BAPA), rivanol test (Riv), serum agglutination test (SAT), mercaptoethanol test (MET) and dot-immunobinding assay (DIA) were 9.50, 10.60, 9.50, 8.51, 9.57 and 11.70-8.50%, respectively. Of the camels in contact with other animals, 6.94-11.10% were positive to brucellosis. The percentages of positive animals based on RBPT, BAPA, Riv, SAT, MET and DIA were 8.30, 9.40, 8.30, 6.94, 8.33 and 8.30-11.10%, respectively. Of the camels in closed farms, 0.00-2.50% were positive to brucellosis. The percentages of positive animals based on RBPT, BAPA, Riv, SAT, MET and DIA were 1.25, 2.50, 0.00, 1.25, 0.00 and 1.25-5.00%, respectively. The results of sensitivity and specificity of DIA revealed that DIA using n-lauroylsarcosin extract was more specific than DIA whole bacterial antigen. The sera of camels infected with Brucella (either camels in contact with animals or imported) showed elevated levels of each of gamma-glutamyltransferase (GGT), lactate dehydrogenase (LDH),

alkaline phosphatase (ALP), aspartate aminotransferase (AST), alanine aminotransferase (ALT), total protein, albumin, glucose, urea, uric acid and creatinine. The sera of imported camels infected with brucellosis were characterized by increased levels of protein bands with molecular weights of 29.83-30.11, 45.95-46.27 kDa, with increase of 34.64, 35.29, 74.67, 87.74, 98.96, 99.75, 104.62, 110.57, 115.54, 132.63, 134.12, 138.69, 140.25 kDa protein bands in both camels in contact with animals and imported camels infected with brucellosis. Protein bands 181.31-183.34 and 214.36 KDa were apparent in the sera of camels in contact with animals infected with brucellosis, and protein bands 189.59 and 231.79 were present in the sera of imported camels infected with brucellosis especially in 1/320 antibody sera. The LDH and ALP isoenzymes had a characteristic profile in brucellosis. It was concluded that imported camels infected with brucellosis had more serious biochemical alterations, followed by camels in contact with animals infected with brucellosis. The results provided an index for the diagnosis of brucellosis in the imported camel. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Brucella*, alanine aminotransferase, alkaline phosphatase, antibodies, aspartate aminotransferase, blood chemistry, blood proteins, blood sugar, brucellosis, creatinine, diagnosis, diagnostic techniques, gamma glutamyltransferase, immunodiagnosis, imports, lactate dehydrogenase, prognosis, serology, serum albumin, urea, uric acid, alkaline phosphomonoesterase, blood glucose, blood plasma proteins, blood serum proteins, glucose in blood, glutamate pyruvate transaminase, glutamic pyruvic transaminase, glutamyl transferase, GOT, GPT, serological diagnosis, Egypt.

Hunter, A (Editor). ***La Sante Animale. Volume 2. Principales Maladies. [Animal Health. Volume 2. Principal Diseases.]*** Published by Editions Quae, Versailles. 2006; 310 pp. ISBN: 2759200051; 9782759200054. Note: In French.
Abstract: The first volume of this work considered the fundamentals of animal pathology and the principles of disease control; volume 2 considers the most important diseases of livestock in the tropics and subtropics in more detail. Each disease is described with reference to its symptoms, aetiology, mode of transmission, treatment and prevention. The first part covers infectious and contagious diseases (viral and bacterial diseases, coccidiosis and dermatomycoses) of livestock in general, bovines, small ruminants, camels, equines and pigs. Part 2 covers venereal and congenital infections; part 3 describes arthropod parasites (flies, lice, fleas, ticks and mange mites). Vector-borne diseases of livestock in general, small ruminants and equines are considered in part 4, helminths and helminthoses in part 5, and environmental and other diseases (metabolic disorders, neoplasms, nutritional deficiency and poisoning) in part 6. This book is intended for use by veterinary technicians and agricultural advisors, and as a textbook in higher education. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, horses, pigs, sheep, pigs, livestock animal diseases, bacterial diseases, clinical aspects, coccidiosis, deficiency diseases, animal disease transmission, drug therapy, ectoparasites, helminthes, infectious diseases, metabolic disorders, poisoning, prophylaxis, tropics, vector borne diseases, viral diseases, bacterial infections, bacterioses, chemotherapy, clinical picture, communicable diseases, parasitic worms, toxicosis, tropical countries, viral infections.

Karam, Halima Zadi; Karam, NE. **Bacteries lactiques du lait de chamelle d'Algerie: mise en evidence de souches de *Lactococcus* resistantes au sel. [Lactic acid bacteria of camel milk: Presence of salt resistant strains of *Lactococcus*.]** *Tropicultura.* 2006; 24(3): 153-156. ISSN: 0771-3312. Note: In French.
Descriptors: camels, raw camel milk, lactic acid bacterial strains, *Lactococcus*, *Leuconostoc*, *Lactobacillus*, 6.5% salt resistant coccal isolates, *Lactococcus lactis* ssp *lactis* (1.2%), *Lactococcus lactis* ssp. *cremoris* (4.9%), *Lactococcus lactis* ssp. *diacetylactis* (28.4%), enterococcal strains (34.6%), *Enterococcus feacalis* sp, *Leuconostoc lactis* (7.4%) or *Leuconostoc dextranicum* (4.9%), *Lactobacillus plantarum* (18.5%).

Khorasgani, MR; Bokaie, S; Moallemzadeh, SA; Salehi, TZ. **A note on serological survey of camel brucellosis in Qum Province, Iran.** *Journal of Camel Practice and Research.* 2006; 13(1): 51-52. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Rose bengal plate agglutination (RBPT), standard tube agglutination (STAT) and 2-mercaptoethanol (2ME) tests were used for the serological diagnosis of camel brucellosis. 240 blood samples were collected from one-humped camels (*Camelus dromedarius*) in Qum province, Iran. Out of the 240 serum samples, 28, 27 and 26 were positive in RBPT (11.6%), STAT (11.2%) and 2ME (10.8%), respectively. The serological differences between male and female camels as well as between age groups were insignificant. In this survey, the seroprevalence of camel brucellosis in Quam province was found to be ~11%, which was considered high. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Brucella abortus*, rose Bengal plate agglutination tests, disease prevalence, disease surveys, epidemiology, immunodiagnosis, immunological techniques, rose-bengal plating, serological surveys, seroprevalence, 2 mercaptoethanol, seroepidemiology, serological diagnosis.

Kinne, J; Johnson, B; Jahans, KL; Smith, NH; Ul-Haq, A; Wernery, U. **Camel tuberculosis-a case report.** *Tropical Animal Health and Production.* 2006 Apr; 38(3): 207-213. ISSN: 0049-4747
DOI: http://dx.doi.org/10.1007/s11250-006-4366-8
NAL call no : SF601.T7
Descriptors: dromedary camels, case studies, *Mycobacterium tuberculosis* complex, tuberculosis in animals, lungs, disease diagnosis, United Arab Emirates.

Mochabo, MOK; Kitala, PM; Gathura, PB; Ogara, WO; Eregae, EM; Kaitho, TD; Catley, A. **The socio-economic impact of important camel diseases as perceived by a pastoralist community in Kenya.** *Onderstepoort Journal of Veterinary Research.* 2006; 73(4): 269-274. ISSN: 0030-2465
Abstract: The objective of the study was to assess the socioeconomic impact of camel trypanosomiasis (surra) according to the perceptions of the pastoralists community in Kenya. Four livestock grazing units were conveniently selected and in each of them, three groups of key informants comprising five to eight persons were selected for the participatory exercises. Five camel diseases were listed in order of importance according to their severity and frequency of occurrence including trypanosomiasis, mange, non-specific diarrhoea, tick infestations and haemorrhagic septicaemia. The losses listed as incurred due to the five dis-

eases were: losses in milk, meat, blood, fats and hides, dowry payments, depreciation in sale of animals, losses due to infertility and abortions and losses due to the cost of treatment. It was observed that there was good agreement (P<0.05) between the informant groups on the losses incurred as a result of the diseases for all the selected loss indicators. Surra and mange were given high median scores on all the indicators while non-specific diarrhoea, tick infestations and haemorrhagic septicaemia received moderate median scores. It is concluded that the camel plays a central role in the lives of Turkana pastoralists and that surra has a devastating social and economic impact. There is a need for veterinary and policy decision-makers to focus more attention on the control of surra in this arid and semi-arid area of Kenya.
Descriptors: dromedary camels, non-specific hemorrhagic septicemia, diarrhea, mange, parasitoses, pastoral society, protozoal infections, trypanosomiasis, *Trypanosoma evansi*, diarrhea, parasitic diseases, parasitic infestations, parasitosis, protozoal diseases, scouring, losses, socioeconomic aspects, trypanosomosis, Kenya.

Pate, M; èvara, T; Gombac, M; Paller, T; Zolnir-Dovc, M; Emer Üic, I; Prodinger, WM; Barto Ü, M; Zdovc, I; Krt, B; Pavlik, I; Cvetnic, Z; Pogacnik, M; Ocepek, M. **Outbreak of tuberculosis caused by *Mycobacterium caprae* in a zoological garden.** *Journal of Veterinary Medicine B.* 2006 Oct; 53(8): 387-392. ISSN: 0931-1793
DOI: http://dx.doi.org/10.1111/j.1439-0450.2006.01000.x
NAL call no: 41.8 Z52
Abstract: In the autumn of 2004, tuberculosis caused by *Mycobacterium caprae* occurred in a zoo in Slovenia. A dromedary camel (*Camelus dromedarius*) was killed after a history of progressive emaciation. Necropsy findings indicated disseminated tuberculosis, which was confirmed by cultivation of *M. caprae*. Consequently, a tuberculin skin test was performed in all epidemiologically linked animals and another dromedary camel and six bison (*Bison bison*) were positive and killed. *Mycobacterium caprae* was isolated from two bison while *M. scrofulaceum* and *Mycobacterium* spp. were found in two other bison, respectively. The second dromedary camel was found to be negative for mycobacteria under both microscopic and culture tests. The isolates were investigated with commercial identification kits, IS6110 PCR, IS6110 restriction fragment length polymorphism analysis, spoligotyping and mycobacterial interspersed repetitive units typing. Genotyping results revealed that the dromedary camel and the two bison were infected by the same *M. caprae*.
Descriptors: dromedary camels, bison, zoo animals, *Mycobacterium bovis* subsp. *caprae*, disease outbreaks, animal pathogenic bacteria, tuberculosis, animal diseases, disease diagnosis, pathogen identification, disease transmission, Slovenia.

Quddoumi, SS; Bdour, SM; Mahasneh, AM. **Isolation and characterization of methicillin-resistant Staphylococcus aureus from livestock and poultry meat.** *Annals of Microbiology*. 2006; 56(2): 155-161. ISSN: 1590-4261
NAL call no: QR1 .A552
URL: http://www.annmicro.unimi.it/
Descriptors: chicken meat, mutton, beef, camel meat, food contamination, bacterial contamination, *Staphylococcus aureus*, methicillin, antibiotic resistance, random amplified polymorphic DNA technique.

Sabocanec, R; Grabarevic, Z; Seol, B; Bedrica, L; Gudan, A; Dzaja, P; Vitkovic, K; Curic, S; Ancic, Z. **Clostridiuminfektion bei einem zweihockrigen Kamel (*Camelus bactrianus)* im Zagreber Zoo. Clostridiosis in two humped camels (*Camelus bactricanus*) in Zagreb Zoo.** *Tierarztliche Umschau*. 2006; 61(6): 322-328. ISSN: 0049-3864. In German with an English summary.

URL: http://www.tu-online.de

Abstract: A case of peracute clostridiosis in a 7-year-old two-humped camel (*Camelus bactrianus*) maintained at Zagreb Zoo is described (Croatia, date not given). Pathological and bacteriological examinations were conducted. The animal died suddenly, overnight, without any clinical signs. It was kept with two other camels which have not shown any disease signs. Gross lesions included degeneration of the myocardium with sub-epicardial ecchymoses, haemorrhage of the pharynx and larynx, severe nephrosis and haemorrhagic abomasoenteritis. All the organs were examined histologically. Bacteriological examination of the intestine and lung specimens revealed *Clostridium perfringens.*

Descriptors: Bactrian camel, case report, peracute clostridiosis, clinical finding, autopsy, post mortem examinations, *Clostridium perfringens*, bacterial infection, bacterial diseases, diagnosis, zoo animals, Croatia.

Sajjad ur Rahman; Muhammad Siddique; Rasool, MH. **Seroprevalence of *Mycoplasma mycoides* subspecies *capri* in ruminants and camel.** *Small Ruminant Research.* 2006; 63(1/2): 28-31. ISSN: 0921-4488

NAL call no: SF380.I52

Abstract: The present work was carried out to study the seroprevalence of *Mycoplasma mycoides* subsp. *capri* in small and large ruminants and their possible role in its transmission among goat population. A total of 1288 serum samples were collected from randomly selected small and large animals including goat, sheep, cattle, buffalo and camel slaughtered in Faisalabad abattoir. The percentages of positive sera were recorded after preliminary screening of all samples through counter immunoelectrophoresis (CIE) test. To rule out the possibility of false positive results and to determine the geometric mean antibody titre (GMT), the positive samples through CIE were subjected to indirect haemagglutination (IHA) test. Seroprevalence was recorded in each species of animal. Overall results showed that goat sera were highly seropositive through CIE (7.3) and IHA (1.6), followed by sheep and cattle. In sheep, positive percentage was 2.6 and 1.5 through CIE and IHA tests, respectively. In cattle, 1.9% was positive through CIE and 0.7% through IHA test. Camel and buffalo population were positive for CIE as 1.3 and 0.8%, respectively. There was no evidence of IHA antibody response in their serum. The GMT through IHA test was 3.5, 3.0 and 2.3 in goat, sheep and cattle, respectively. The overall prevalence was 3.0+or-0.9 and 0.8+or-0.5% through CIE and IHA tests, respectively. The CIE was found an efficient, sensitive and economical test for initial screening whereas IHA test was found more specific and used for antibody titration. The percentage of positive samples was higher in sheep and cattle after goat which indicates their possible role in the transmission of M. mycoides subsp. capri among goat population.

Descriptors: buffaloes, camels, cattle, goats, sheep, *Mycoplasma mycoides* subspecies *capri*, antibodies, counterimmunoelectrophoresis, diagnosis, diagnostic techniques, disease prevalence, disease transmission, hemagglutination, seroprevalence, Pakistan.

Shuchismita Chatterjee; Kashyap, SK. **Serogroups of *Escherichia coli* isolated from camel, cattle, sheep and poultry.** *Indian Veterinary Journal.* 2006; 83(5): 479-482. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: The present investigation involved the isolation and identification of *E. coli* isolates from diarrhoeic and non-diarrhoeic faecal samples of camels, cattle, sheep and poultry in Bikaner, Rajasthan, India [date not given]. Out of 260 strains subjected to serotyping, 219 were identified as belonging to established O subgroups, while the remaining 41 were untypable. The most predominant O serogroup found in all host species was O8 (11.87%), followed by O60 (6.85%), O38 (5.02%), O131 (4.1%), O80 (3.65%), O77 (3.19%), O5, O76, O109 (2.73% each) and O158 (2.58%). In all, 74 O serogroups of E. coli isolates were differentiated, including O78 and O157, which are usually considered highly pathogenic. O serogroups 1, 4, 5, 8, 9, 23, 24, 25, 27, 30, 36, 86, 87, 101, 107, 113, 140, 153, 158, 159, 165, 166, 172 and 173 are reported in camels in this area for the first time.
Descriptors: dromedary camels, cattle, sheep, poultry, fecal sampling, *Escherichia coli,* serotypes, predominant O serotype, diarrhea, epidemiological surveys, epidemiology, feces, Rajasthan, India.

Tanwar, RK. **Pulmonary tuberculosis in camels (*Camelus dromedarius*).** *Veterinary Practitioner.* 2006; 7(1): 17-18. ISSN: 0972-4036
Descriptors: dromedary camels, tuberculosis, *Mycobacterium*, case reports, dyspnea, clinical aspects, cough, bronchopneumonia, diagnosis, disease control, drug therapy, histopathology, non steroidal anti-inflammatory agents, NSAIDs, oxytetracycline, sulfadimidine, sulfamethazine, trimethoprim, terramycin, Rajasthan, India.

Tibary, A; Fite, C; Anouassi, A; Sghiri, A. **Infectious causes of reproductive loss in camelids.** *Theriogenology*. 2006 Aug; 66(3): 633-647. ISSN: 0093-691X
DOI : http://dx.doi.org/10.1016/j.theriogenology.2006.04.008
NAL call no: QP251.A1T5
Abstract: Reproductive losses in camelids are due to infertility, pregnancy loss, udder diseases and neonatal mortality caused by a variety of infectious diseases. Uterine infection and abortion represent the major complaint in camelid veterinary practice. The major infectious organisms in endometritis and metritis are *E. coli* and *Streptococcus equi* subspecies *zooepidemicus*. Abortion rates due to infectious diseases vary from 10% to more than 70% in some areas. Leptospirosis, toxoplasmosis and chlamydiosis have been diagnosed as the major causes of abortion in llamas and alpacas. In camels, brucellosis and trypanosomiasis represent the major causes of infectious abortion in the Middle East and Africa. Mastitis is rare in South American camelids. The prevalence of subclinical udder infection in camels can reach very high proportions in dairy camels. Udder infections are primarily due to *Streptococcus agalactiae* and *Staphylococcus aureus*. Neonatal mortality is primarily due to diarrhea following failure of passive transfer and exposure to *E. coli*, rotavirus, coronavirus, *Coccidia* and *Salmonella*. This paper reviews the etio-pathogenesis of these causes of reproductive losses, as well as the major risk factors and strategies to prevent their occurrence.
Descriptors: large animal practice; llamas, alpacas, dromedaries, dairy animals, animal reproduction, reproductive losses, abortion (animals), female fertility, mastitis, neonatal mortality,

colostral immunity, endometritis, *Escherichia coli*, *Streptococcus equi* subsp. *zooepidemicus*, toxoplasmosis, *Chlamydia*, etiology, pathogenesis, risk factors, disease control, disease diagnosis.

Ur Rahman, S; Siddique, M; Rasool, MH. **Seroprevalence of *Mycoplasma mycoides* subspecies capri in ruminants and camel.** *Small Ruminant Research*. 2006 May; 63(1-2): 28-31. ISSN: 0921-4488

DOI: http://dx.doi.org/10.1016/j.smallrumres.2005.01.012

NAL call no: SF380.I52

Abstract: The present work was carried out to study the seroprevalence of *Mycoplasma mycoides* ssp. *capri* in small and large ruminants and their possible role in its transmission among goat population. A total of 1288 serum samples were collected from randomly selected small and large animals including goat, sheep, cattle, buffalo and camel slaughtered in Faisalabad abattoir. The percentages of positive sera were recorded after preliminary screening of all samples through counter immuno-electrophoresis (CIE) test. To rule out the possibility of false positive results and to determine the geometric mean antibody titer (GMT), the positive samples through CIE were subjected to indirect haemagglutination (IHA) test. Seroprevalence was recorded in each species of animal. Overall results showed that goat sera were highly seropositive through CIE (7.3) and IHA (1.6), followed by sheep and cattle. In sheep, positive percentage was 2.6 and 1.5 through CIE and IHA tests, respectively. In cattle, 1.9% was positive through CIE and 0.7% through IHA test. Camel and buffalo population were positive for CIE as 1.3 and 0.8%, respectively. There was no evidence of IHA antibody response in their serum. The GMT through IHA test was 3.5, 3.0 and 2.3 in goat, sheep and cattle, respectively. The overall prevalence was 3.0 +/- 0.9 and 0.8 +/- 0.5% through CIE and IHA tests, respectively. The CIE was found an efficient, sensitive and economical test for initial screening whereas IHA test was found more specific and used for antibody titration. The percentage of positive samples was higher in sheep and cattle after goat which indicates their possible role in the transmission of *M. mycoides* ssp. *capri* among goat population.

Descriptors: goats, sheep, cattle, buffaloes, camels, *Mycoplasma mycoides* subsp. *Capri*, animal pathogenic bacteria, mycoplasmosis, animal diseases, seroprevalence, disease transmission, slaughterhouses, immunoelectrophoresis, disease surveillance, diagnostic techniques, hemagglutination tests, alternative hosts, disease reservoirs, counter immunoelectrophoresis test, indirect hemagglutination test.

2005

Abbas, B; Omer, OH. **Review of infectious diseases of the camel.** *Veterinary Bulletin.* 2005; 75(8): 1N-16N. ISSN: 0042-4854

URL: http://www.cabi-publishing.org/vb

Abstract: Camels were formerly considered resistant to most of the diseases commonly affecting livestock, but as more research was conducted, camels were found to be susceptible to a large number of pathogenic agents. For some diseases such as pox, mange, and enterotoxaemia, camels were indeed more susceptible and manifested more severe signs than other ruminants in the same ecozones. Pneumonia, mastitis and calf diarrhoea are the most

common bacterial diseases of camels and are caused by a large number of microorganisms. Pox, contagious echthyma, papillomatosis and rabies are the only established viral diseases in camels. Although infection with several other viruses, including rinderpest, bluetongue, African horse sickness and rift valley fever has been demonstrated by serological methods, camels did not show signs of disease in spite of being in close contact with affected livestock. Camels also did not develop clinical signs of foot and mouth disease after housing for several weeks with affected animals. Increased interest in the camel as a multipurpose animal has been met with increased research into the aetiology and pathology of camel diseases; very few studies, however, have been directed towards their control.

Descriptors: dromedary camels, susceptibility to diseases, disease resistance, bacterial diseases, viral diseases, pneumonia, mastitis, calf diarrhea, disease control, disease resistance, enterotoxemia, infectious diseases, parasites, mange, rabies, salmonellosis, susceptibility, *Aspergillus fumigatus*, *Clostridium perfringens*, contagious ecthyma virus, papillomavirus, contagious pustular dermatitis, CPD virus, Hyphomycetes, *Salmonella* infections, scabby mouth.

Ali, MM; Makar, NH; Seddek, SR. **Serological study of brucellosis on camels in Assiut and New Valley Governorates.** *Assiut Veterinary Medical Journal.* 2005; 51(105): 158-164. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: A serological study was performed using the sera of 300 camels collected from Assiut and New Valley Governorates to estimate the incidence of *Brucella* infection. All samples were examined serologically using buffered acidified plate antigen test (BAPAT) and Rose Bengal plate test (RBPT) and positive reactors were confirmed by tube agglutination test (TAT) and Rivanol tests (R.T.). Out of the 300 sera tested, 7 positive reactors (2.33) were detected (2 males (0.66%) and 5 females (1.66%)). The incidence in Assiut was 3.04% while no positive reactors were detected in New Valley. It is concluded that brucellosis in camels represents a serious public health risk through the consumption of milk, milk products and meat of seropositive animals and so camels must be included in the national programme for the control and eradication of brucellosis in Egypt. Reproduced with permission of CAB.

Descriptors: humans, dromedary camels, levels of brucellosis, diagnosis diagnostic techniques for *Brucella*, disease prevalence, epidemiology, geographical distribution, human diseases, serology, sex differences, zoonoses, Egypt.

Antoine Moussiaux, N; Faye, B; Vias, GF. **Tuareg ethnodiagnostic skill of camel diseases in Agadez area (Niger).** *Journal of Camel Practice and Research.* 2005; 12(2): 85-93. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: For generations, nomad herders have been learning to manage herd health, particularly in dromedaries, because of their high value. They have thus acquired a very comprehensive knowledge of signs of illness and have developed their own nomenclature. The present study aims at the description, scientific identification and recognition of this ethnoveterinary knowledge by means of an investigation carried out in Tuareg populations living in the neighbourhoods of Agadez (Niger) in November 2003-January 2004. The dominant pathologies cited by herders for being the most alarming are gastrointestinal helminthoses (izni), camel calf diarrhoea (efay), tick infestations of camel calves (igardan), camel pox (erk eshik), sarcoptic mange (ajud) and bronchopneumonia (toza). Poorly identified nosologic

entities are also reported. Reproduced with permission of CAB.
Descriptors: dromedary camels, etiology, camel diseases; herd health management, Tuareg nomads, traditional medicine, ethnoveterinary knowledge, diagnosis, diarrhea, helminthoses, helminthes, intestinal worms, parasitoses, pneumonia, scabies, Niger.

Chouhan, HC; Chandel, BS; Vasava, KA; Pawar, DW; Patel, AR; Shah, NM; Kher, HN. **Seroprevalence of brucellosis in dromedaries in Gujarat.** *Journal of Camel Practice and Research.* 2005; 12(2):132-134. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The seroprevalence of brucellosis in dromedaries of north Gujarat and Kutchchh regions of Gujarat, India, was investigated [date not given]. Out of 300 sera tested 112 males and 188 females, 19 (6.33%) and 18 (6.00%) were found positive by rose Bengal plate test (RBPT) and standard tube agglutination test (SAT), respectively. The region-wise seroprevalence recorded was 7.04 and 4.60% in Kuchchh by RBPT and SAT, respectively. An almost similar rate of seroprevalence was observed in both sexes. The results of present study confirm the presence of brucellosis in camels of Gujarat state.
Descriptors: dromedary camels, *Brucella*, brucellosis, agglutination tests, diagnosis, disease prevalence, disease surveys, epidemiological surveys, epidemiology, serological surveys, seroprevalence, Gujarat, India.

Dixit, SK; Tuteja, FC; Singh, AP. **Some non-parasitic skin infections in camels.** *Veterinary Practitioner.* 2005; 6(2): 173-175. ISSN: 0972-4036
Descriptors: dromedary camels, wounds, injuries, skin conditions, bacterial infections, etiology, antibacterial agents, antibiotics, drug therapy, immunization, immunology, reviews, treatment, vaccination, vaccines.

Faye, B; Esenov, P. ***Desertification Combat andFood Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.*** IOS Press, Amsterdam. 2005; 225 pp
Abstract : This book gives an overview of the status of camel production, development of camel products and maintenance of animal productivity in order to satisfy human requirements both in quantity and quality. The workshop contributes to the exchange between scientists in order to allow access to new approaches and methodologies by all desert and camel scientists in the involved countries (Western European countries, Mediterranean countries and Central Asian Republics). The 4 papers presented in the plenary sessions discuss the new trends in camel sciences, desertification in Central Asian countries, Arvana breed camel and the association between camel and society. A total of 14 papers give emphasis on desertification, selection, breeding and diseases of camels. Camel keeping and productiveness are discussed in 16 papers. Moreover, recommendations are given. Reproduced with permission of CAB.
Descriptors: desertification, desert animals, domestication, dromedary camels, Bactrian camels, camel production, pasteurizing, grazing behaviors, reproductive performance, selective camel breeding, camel genetic resources, camel-based products, camel milk production, camel milk composition, camel milk products, sour milk, lactoferrin, leptin, lipids, fiber products, fleece, wool, adipocytes, disease prevention, infectious diseases, mycoses, probiotics, therapy,

Gadir, AEA; Hildebrandt, G; Kleer, JB; Molla, B. **Susceptibility of bacteria isolated from camel (*Camelus dromedarius*) mastitis to commonly used antimicrobials.** *Journal of Camel Practice and Research.* 2005; 12(1): 37-39. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A total of 219 bacterial isolates from lactating camels with intramammary infection were subjected to in vitro antimicrobial susceptibility test using single disc diffusion methods. It was observed that *Staphylococcus aureus* isolates were 100% susceptible to tetracycline, kanamycin, chloramphenicol, gentamicin and streptomycin. Oxytetracycline and tetracycline were the drugs of choice for *Streptococcus agalactiae*. *E. coli* isolates were highly sensitive to kanamycin and gentamicin. Oxytetracycline, tetracycline and chloramphenicol were effective against camel mastitis pathogens with the exception of *Pasteurella haemolytica* and *Enterobacter aerogenes*. A high level of resistance of mastitis pathogens was recorded against nalidixic acid and erythromycin. Reproduced with permission of CAB.

Descriptors: dromedary camels, mastitis, bacterial infection, bacterial pathogen species, effective antiobiotic treatment, chloramphenicol, drug resistance, erythromycin, gentamicin, kanamycin, nalidixic acid, oxytetracycline, streptomycin, tetracycline, terramycin, achromycin, *Enterobacter aerogenes*, *Escherichia coli*, *Pasteurella hemolytica*, *Staphylococcus aureus*, *Streptococcus agalactiae*.

Gadir, AEA; Hildebrandt, G; Kleer, J; Molla, B; Kyule, M; Baumann, M. **Prevalence and risk factors of camel (*Camelus dromedarius)* mastitis based on bacteriological examinations in selected regions of Ethiopia.** *Journal of Camel Practice and Research.* 2005; 12(1): 33-36. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The present study was carried out to determine the prevalence of clinical and subclinical mastitis in camels of Dire Dawa, Gewane (Afar Region), and Negele (Borena Region), Ethiopia, identify the bacteria that caused the infection and analyse some risk factors (tick infestation, teat lesions, conformation of udder, and previous history of mastitis) that may result to the occurrence of mastitis. A total of 956 quarter milk samples from 253 traditionally managed lactating camels were collected aseptically from Negele, Dire Dawa and Gewane using the multi-stage sampling method. The samples were examined using standard microbiological techniques. It was observed that there was a high (46.2%) prevalence of subclinical mastitis recorded in the milk samples from Dire Dawa followed by Gewane (45.4%) and Negele (37.1%). Clinical mastitis was observed only in Negele at 1.1%. A total of 571 (59.73%) isolates were obtained from the quarter milk samples. Out of 571 isolates, 428 (75.00%) were major pathogens (MAP) and 143 (25.00%) were minor pathogens (MIP). The common pathogens isolated from subclinical mastitis were *S. aureus* and *E. coli* while *S. aureus*, S. *hyicus*, *Streptococcus uberis*, *Bacillus cereus*, *E. coli* and *S. epidermidis* were isolated from clinical cases. There was no statistical significance between the occurrence of mastitis and various risk factors, but a positive correlation was recorded between the use of anti-suckling devices and mastitis occurrence. It is concluded that mastitis in camels is prevalent in the study sites and the use of anti-suckling devices is incriminated as a risk in spreading intramammary infections. Reproduced with permission of CAB.

Descriptors: dromedary camels, mastitis, sub clinical mastitis, bacterial pathogens in camel milk, disease prevalence, epidemiology, geographical distribution, risk factors, anti-sucking

devices, *Bacillus cereus*, *Escherichia coli*; *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Staphylococcus hyicus*, *Streptococcus uberis*, Abyssinia, Ethiopia.

Kane, Y; Kadja, MC; Bada Alambedji, R; Bezeid, OE; Akakpo, JA; Kaboret, Y. **Lesions et bacteries des poumons du dromadaire (Camelus dromedarius) a l'abattoir de Nouakchott en Mauritanie . [Lung lesions and bacteria of the one-humped camel (*Camelus dromedarius*) at Nouakchott slaughterhouse in Mauritania].** *Revue d' Elevage et de Medecine Veterinaire des Pays Tropicaux.* 2005; 58(3): 145-150. ISSN: 0035-1865. Note: In French with an English and Spanish summary.

Abstract: Data about pulmonary diseases of the dromedary are rare in Mauritania. The aim of this study was to determine the prevalence of pulmonary lesions and associated bacteria in the lungs of dromedaries at the slaughterhouse of Nouakchott, Mauritania. 729 (31.5%) lungs were examined of 2315 animals slaughtered during the period of the study. 421 presented lesions (57.7%) of the 729 examined lungs. The main type of lesion were focal atelectasis (68.6%), isolated pleurisy (64.4%) and partial emphysema (59.1%). Pneumonia and hydatid cyst prevalences were 24 and 5.2%, respectively. These lesions were classified as minor or major lesions and 17.3% (73/421) of the lesions observed were major. The high frequency (64.4%) and macroscopic aspect of pleurisy were particular facts. Lastly, a relatively high frequency of blood aspiration was noted in the lungs (26.5%). The histopathological examination revealed parasites and bacteria in the pulmonary lesions. 16 bacterial genera and several bacterial species were isolated. Aside from *Bacillus* and Proteus bacteria, the most frequently isolated in the three sampling types were Streptococcus sp., *Staphylococcus* sp. and *Escherichia*. Several associations of bacterial species were noted within the same sample. The bacterial genera associated with major pulmonary lesions were *Streptococcus*, *Staphylococcus*, *Klebsiella* and *Corynebacterium*.

Descriptors: camels, etiology, pulmonary disease prevalence, disease surveys, echinococcosis, epidemiology, hydatid lesions, lungs, mixed infections, respiratory diseases, *Bacillus*, *Corynebacterium*, *Escherichia*, *Klebsiella*, *Proteus*, *Staphylococcus*, *Streptococcus*, causal agents, disease surveillance, etiology, hydatid disease, hydatidosis, lung diseases, multiple infections, Mauritania.

Mahzounieh, M; Jafar, MP; Salehi, TZ; Nazari, A. **Serological survey of antibodies to Salmonella groups A, B, C and D in dromedary camels of Iran.** *Journal of Camel Practice and Research.* 2005; 12(2): 129-131. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Salmonellosis is considered as one of the most widespread foodborne zoonoses. The asymptomatic infected animals are the common sources of foodborne salmonellosis. This study was carried out to determine the distribution of Salmonella serotypes infections in apparently healthy slaughter camels in central Iran [date not given]. 384 serum samples were tested for the presence of anti-Salmonella spp. antibodies by rapid and tube agglutination tests. Anti-Salmonella antibodies were positive in 8 (2.08%), 8 (2.08%), 7 (1.82%) and 5 (1.30%) samples against A, B, C and D somatic antigens, respectively. All of anti-Salmonella antibody titres were less than 80 in the tube agglutination test. There was no significant correlation between sex and seropositivity. These results show that apparently healthy camels may be infected by different Salmonella spp. serotypes and could be a source of carcass and

organ contamination in abattoirs. In camels, Salmonella can cause enteritis, septicaemia and abortion, especially in young animals. The low titres may be due to the age of animals, because all samples were collected from 2 or more years old apparently healthy camels.
Descriptors: dromedary camels,agglutination tests, antibodies, antibody testing, bacterial antigens, disease prevalence, disease surveys, epidemiological surveys, epidemiology, salmonellosis, *Salmonella* infections, serological surveys, seroprevalence,serotypes, zoonoses, zoonotic disease, Iran.

Matofari, JW; Younan, M; Nanua, JN; Mwatha, EW; Okemo, PO. **Microorganisms associated with sub-clinical mastitis and their impact on milk production in camels (*Camelus dromedarius*) in semi-arid lands of Northern Kenya.** *International Journal of Agriculture and Rural Development.* 2005; 6: 182-187. ISSN: 1595-9716
URL: http://www.ajol.info/viewarticle.php?jid=12&id=24361&layout=abstract
Abstract: Camels are adapted to the arid and semi arid lands (ASAL), but their full `milking potential is affected by udder infection especially sub-clinical mastitis. The purpose of this study was to identify the most common pathogens responsible for sub-clinical mastitis in camels kept under ranch conditions in Northern Kenya. A total of 435 camel milk samples were collected over a period of 11 months and examined for mastitis causing microorganisms. Mastitis causing bacteria were isolated from 66.7% of the samples. The most prevalent groups were group D streptococci (30%), coagulase negative *Staphylococcus* (CNS) (20.1%), *Staphylococcus aureus* (16%), *Streptococcus dysgalactiae* (3.6%) and *Streptococcus agalactiae* (1.5%). Other isolates were Coliforms and Micrococci. *Streptococcus dysgalactiae* and *Streptococcus agalactiae* had a greater association with sub-clinical mastitis than the other pathogens. *Streptococcus agalactiae* and *Staphylococcus aureus* were ranked as infectious pathogens while group D streptococci, *Streptococcus dysgalactiae,* CNS, Coliforms and Micrococci were ranked as environmental pathogens. The mean milk yield from quarters infected with infectious streptococcal pathogens was 1.58 L per milking, which was lower than that from quarters infected with environmental streptococci (2.63 L). Sub-clinical mastitis in camels has adverse implications and needs to be addressed in order to maximize camel production in the ASAL.
Descriptors: dromedary camels, camel milk yield, subclinical mastitis, udder quarters, coliform bacteria, coagulase negative staphylococci, *Staphylococcus aureus,Streptococcus agalactiae*, *Streptococcus dysgalactiae*, semiarid climate, Kenya.

Megersa, B; Molla, B; Yigezu, L. **Seroprevalence of brucellosis in camels (*Camelus dromedarius*) in Borena lowland, Southern Ethiopia.** *Bulletin of Animal Health and Production in Africa.* 2005; 53(4): 252-257. ISSN: 0378-9721. Note: In English with a French summary.
Abstract: A cross-sectional study was undertaken from August 2003 to January 2004 to estimate the seroprevalence of camel brucellosis and associated risk factors in two districts of Borena lowland, southern Ethiopia. The two districts were selected purposively whereas pastoral associations and animals in a herd in the two districts were selected randomly using cluster sampling. Blood samples were collected from a total of 3218 camels that were two years of age and above. All serum samples were initially screened by the Rose Bengal Plate Test (RBPT). Positive serum samples were further tested by the Complement Fixation Test (CFT) for confirmation. *Brucella* antibodies were detected in 1.8% (58/3218) of the camels tested. Sixteen percent of the herds (40/250) had one or more animals positive for brucel-

losis. The effect of sex was observed to be significant for seroprevalence ($p<0.05$) with odds ratio of 2.3 (95% CI=1.1-5.3) times higher in females than male camels. Young animals (2 to 4 years) had statistically lower reactors than adult camels ($p<0.05$), the odds of ratio being 2.2 (95% CI=1.1-4.6) times lower in young camels. Similarly, there was a significant increase in seropositivity with respect to increasing herd size ($p<0.05$). Reproduced with permission of CAB.

Descriptors: dromedary camels, antibodies, *Brucella,* brucellosis, complement fixation tests, disease prevalence, epidemiology, risk factors, Rose Bengal Plate Test, serology, seroprevalence, Ethiopia, Abyssinia.

Mochabo, KOM; Kitala, PM; Gathura, PB; Ogara, WO; Catley, A; Eregae, EM; Kaitho, TD. **Community perceptions of important camel diseases in Lapur Division of Turkana District, Kenya.** *Tropical Animal Health and Production.* 2005; 37(3): 187-204. ISSN: 0049-4747. Note: In English with a Spanish and French summary.

DOI: http://dx.doi.org/10.1023/B:TROP.0000049301.15826.78

Abstract: This paper presents the results of a study conducted in Lapur Division of Turkana District, Kenya, to estimate the incidence and mortality of camel trypanosomosis using participatory methods. Four livestock camps ('adakars') were conveniently selected for the study. Four informant groups comprising 6-8 key persons were used for the participatory exercises. The camel diseases identified by the pastoralists in their order of importance according to annual incidence were: trypanosomosis (11.4%); mange (10.8%); tick infestation (7.9%); haemorrhagic septicaemia (7.7%); and non-specific diarrhoea (7.6%). Almost half (49.3%) of the camel population suffered from at least one disease over the previous year. The annual incidence and mortality rates of trypanosomosis were estimated at 15% and 9.9% in adult camels and 6.9% and 5.2% in young camels, respectively. There was a seasonal occurrence of trypanosomosis, with most cases reported in the dry season. The prevalence levels of the disease reportedly declined from about 100% in 1978 to an almost stable state of about 15% in 2002. This study revealed that camel trypanosomosis is still an important disease in Turkana District, exacting a heavy toll in terms of morbidity and mortality. The economic losses due to the disease were likely to have been great owing to the central role the camel plays in this arid district of Kenya.

Descriptors: dromedary camels, diseases of important, hemorrhagic septicemia, mange, *Trypanosoma*, trypanosomiasis, losses, mortality, Kenya.

Mohammed, A; Molla, B; Ruiz Bascaran, M; Abera, B. **A cross-sectional study of mastitis in camels (*Camelus dromedarius*) in Somali Region, Southeastern Ethiopia.** *Bulletin of Animal Health and Production in Africa.* 2005; 53(3): 195-201. ISSN: 0378-9721. Note: In English with a French summary.

Abstract: One hundred thirty-seven traditionally managed lactating camels (*Camelus dromedarius*) were examined in Somali Region, southeastern Ethiopia to study the prevalence and bacterial causes of mastitis between Nov. 2002-April 2003. Out of the 137 lactating camels, 10.2% (14/137) were positive for clinical mastitis. Of the 532-quarter milk samples examined using the California Mastitis Test (CMT), 256 (48.1%) were positive for mastitis. Of the 256 CMT positive milk samples, 204 (79.7%) yielded pathogenic bacteria. The percentage agreement between CMT and bacteriological results by quarters was 68.4% for CMT

score of trace and 88.9% for CMT score of 3+. A high prevalence of mastitis was observed in camels infested with ticks and camels with teat/udder lesions. The bacteriological results of camel milk samples indicated that Gram-positive cocci were the major bacterial isolates including coagulase-negative Staphylococci, *Streptococcus agalactiae* and *Staphylococcus aureus*. Tick infestations, udder/teat lesions, the use of mud on the tips of the teats and use of other harmful anti-suckling devices were some of the practices observed in the study areas which could predispose camels to mastitis. Reproduced with permission of CAB.
Descriptors: dromedary camels, disease prevalence, mastitis, coagulase negative staphylococci, *Staphylococcus aureus*, *Streptococcus agalactiae*, Ethiopia, Abyssinia.

Osman, KM; El Enbaawy, MI; Amer, H. **Incidence and SDS-page protein profile analysis for *Mycoplasma* spp. and *Acholeplasma* spp. isolated from camels in Egypt.** *Veterinary Medical Journal Giza.* 2005; 53(2(1)): 231-239. ISSN: 1110-1423. Note: "Biotechnology and Animal Wealth Development. Proceedings of the 8th Scientific Conference, Giza, Egypt, 17-19 April."
Abstract: 39 strains of *Mycoplasma* spp. (n=33) and *Acholeplasma* spp. (n=6) were isolated from 118 pneumonic lungs and 110 tracheal samples obtained from different abattoirs in Egypt. The percentages of their isolation were 8.3% from pneumonic lungs and 8.7% from tracheal samples. Based on the biochemical profile and growth inhibition results, the camel isolates were identified as, *M. bovis*, glucose positive *Mycoplasma* and *Mycoplasma arginini.* The identity of these isolates was further confirmed by growth inhibition test using a panel of specific antisera against selected reference *Mycoplasma* spp. Whole-cell protein patterns generated by SDS-PAGE were used to identify and classify field isolates of a chosen *Mycoplasma* spp. (n=19) and *Acholeplasma* spp. (n=6). A high degree of similarity between most of the strains was established with strain-to-strain differences. Reproduced with permission of CAB.
Descriptors: dromedary camels, lung infections, tracheal infections, pneumonia, bacterial isolates, SDS-PAGE, strains, *Mycoplasma* and *Mycoplasma arginini, Acholeplasma*.

Shuchismita Chatterjee; Kashyap, SK. **Pathogenicity testing of *Escherichia coli* isolates of livestock and poultry.** *Veterinary Practitioner*. 2005; 6(2): 105-108. ISSN: 0972-4036
Abstract: The pathogenicity of *Escherichia coli* isolates was determined in mice and chick. The poultry *E. coli* serogroups found pathogenic included serogroups O80, O8, O120, O2, O6, O27, O20, O38 and O33. In mice, the E. coli found pathogenic were O9 and O140 of camel, O58, O78, O77, O154, O60, O109, O131 and O136 of cattle and O8, O37, O60, O76, O109, O153 and O157 of sheep. In rabbit ileal loop assay, the isolates with serogroup O8, O27 and O153 of camel, O60, O131, O78, O8 and O154 of cattle, O157, O8, O153, O109 and O76 of sheep and O8, O120, O2, O80, O27, O6 and O20 of poultry were found enterotoxigenic. Reproduced with permission of CAB.
Descriptors: dromedary camels, chickens, sheep, cattle, livestock, *Escherichia coli* isolates, pathogenicity, serotypes, pathogen virulence.

Smith, RA. (Editor). ***Proceedings of the Thirty-Eighth Annual Convention, American Association of Bovine Practitioners, Salt Lake City, Utah, USA, 24-26 September, 2005.*** Published by the Association. 2005. 298 p.
Abstract: Research on the various aspects of livestock raising and husbandry, including

bovines (cattle and buffaloes), small ruminants (sheep) and camelids, are presented. The topics include aspects of certain communicable and non-communicable diseases, such as clinical manifestations, diagnosis, treatment, control and prevention, as well as the effects of feeding and disease on livestock productivity, especially in beef and dairy herds.
Descriptors: cattle, dromedary camels, sheep, buffaloes, antiinfective agents, bacterial diseases, beef herds, dairy herds, diagnosis, disease prevention, infectious diseases, livestock feeding, medical treatment, protozoal infections, reproductive disorders, antimicrobials, bacterial infections, bacterioses, communicable diseases, protozoal diseases.

Solanki, S; Kataria, AK; Sharma, R; Singh, G. **RAPD fingerprinting for genotypic differentiation of *S. aureus* clinical isolates from camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2005; 12(1): 21-25. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to determine the genotypic differentiation and phylogenetic diversity using random amplified polymorphic DNA (RAPD) of *Staphylococcus aureus* isolates (n=21) from wounds and abscesses (from eyes, nostrils, groin, back and shoulders) of camels. Out of the 10 primers chosen for the discrimination ability of *S. aureus* isolates, three primers, opc 1, 2 and 10, had good discriminatory index and generated 151 polymorphic bands with sizes ranging from 200-2500 base pairs. All the isolates were classified into two groups. Group 1 contained only one isolate, while group 2 contained 20 isolates generating 18 subgroups. The levels of dissimilarity of *S. aureus* ranged between 25 to 100%. Two isolates from subgroup 2 showed 100% similarity level and were put in the same group. It was also observed that there was 100% genetic diversity among *S. aureus* isolates included in the study except isolates 54 Ey and 26 Ey isolated from the eye wounds and isolates 51 N and 8 S from the nostrils and skin wounds, respectively. All the isolates in the study had a wide genotypic variation and were suggestive of the adaptation of *S. aureus* to different host cells, environment, different anatomical positions in a single host and occurrence of mutants. The use of primers with high discriminatory power may also be an important factor for higher genetic diversity. Reproduced with permission of CAB.
Descriptors: dromedary camels, abscesses, pathogen isolates, *Staphylococcus* aureus strains, strain differences, DNA fingerprinting, genetic polymorphism, genetic variation, genotypes, phylogenetics, phylogeny, random amplified polymorphic DNA, wounds, genetic variability.

Sopyev, B; Divanov, B; Charyev, C. **Diseases of camels, their preventive maintenance and treatment.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 60-66. ISBN 1586034731
Descriptors: dromedary camels, Bactrian camels, acaricides, brucellosis, clinical aspects, diagnosis, diminazene, disease prevalence, disease prevention, drug therapy, azidine, berenil, hydatid disease, hydatidosis, echinococcosis, epidemiology, helminthoses, licorice, mange, plague, smallpox, trypanosomiasis, vaccination, *Brucella*, *Cephalopina*, *Echinococcus*, *Glycyrrhiza*, *Sarcoptes scabiei*, *Taenia hydatigena*, *Trypanosoma*, *Yersinia pestis*, Turkmenistan. Central Asia.

Yagoub, SO. **Bacterial diseases of the reproductive system of camels (*Camelus dromedarius*) in Eastern Sudan.** *Journal of Animal and Veterinary Advances.* 2005; 4(7): 642-644. ISSN: 1680-5593

Abstract: A field survey to determine the bacterial diseases of the reproductive system of camels in Eastern Sudan was conducted [date not given]. It was observed that the common diseases of female camels (n=756) were acute catarrhal endometritis, pyometra, chronic endometritis and acute or chronic mastitis. The incidence of these diseases increased with age and reached its peak in autumn. Isolated bacteria included *Staphylococcus aureus*, *E. coli*, *Klebsiella* spp., *Corynebacterium* spp., *Proteus* spp., *Salmonella* spp. and *Streptococcus* spp. Although trials to isolate *Brucella* spp. were negative, high agglutinating titres were detected. Male camels (n=437) had orchitis which was caused by *Staphylococcus aureus*, *E. coli* and *Proteus* spp. These organisms in addition to *Corynebacterium* spp. and *Clostridium* spp. were isolated from wounds of the external genitalia. Incidence of orchitis and wounds of external genitalia also increased with age in autumn.

Descriptors: dromedary camels, age differences, autumn, bacterial diseases, disease surveys, endometritis, genitalia, mastitis, orchitis, pyometra, reproductive disorders, seasonal variation, *Brucella*, *Clostridium*, *Corynebacterium*, *Escherichia coli*, *Klebsiella*, *Proteus*, *Salmonella,Staphylococcus aureus*, Sudan.

Younan, M; Estoepangestie, ATS; Cengz, M; Alber, J; El Sayed, A; Lammler, C. **Identification and molecular characterization of *Streptococcus equi* subsp. *zooepidemicus* isolated from camels (*Camelus dromedarius*) and camel milk in Kenya and Somalia.** *Journal of Veterinary Medicine Series B.* 2005; 52(3): 142-146. ISSN: 0931-1793

DOI: http://dx.doi.org/10.1111/j.1439-0450.2005.00828.x

NAL call no.: 41.8 Z52

Abstract: Seventeen *Streptococcus equi* subsp. *zooepidemicus* strains isolated from camels and camel milk in Kenya and Somalia were identified by their cultural characteristics, by biochemical and serological reactions with the help of commercial identification systems and by molecular studies using a multiplex PCR. The isolates were further characterized by a PCR-mediated detection of size polymorphisms in the 16S-23S rDNA intergenic spacer region and the virulence gene szp and by amplification of the virulence gene cne. These molecular analysis are potentially useful in identifying and characterizing *S. equi* subsp. *zooepidemicus* strains of this origin and could possibly be valuable in epidemiological investigations.

Descriptors: dromedary camels, camel milk, bacterial infections, diagnosis, diagnostic techniques, *Streptococcus equi* subsp *zooepidemicus,* pathogenic strains, strain virulence, strain differences, pathogen identification, disease prevalence, disease surveys, epidemiological surveys, molecular genetics, epidemiology, genes, genetic polymorphism, PCR, polymerase chain reaction, gene amplification, cell culture, Kenya, Somalia.

Wernery, U **The most important infectious diseases in camelids.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 67-69. ISBN 1586034731

Descriptors: camelids, dromedary camels, Bactrian camels, anthrax, aspergillosis, brucellosis, coccidioidomycosis, coccidiosis, endotoxemia, enterotoxemia, melioidosis, mycoses,

nematode, infections, paratuberculosis, Johne's disease, pasteurellosis, rabies, salmonellosis, scabies, smallpox, trematode infections, trypanosomiasis, tuberculosis, zoonoses, influenza, *Aspergillus,Bacillus anthracis*, borna disease virus; *Brucella*, *Burkholderia pseudomallei*, *Clostridium perfringens*, *Coccidioides immitis*, Digenea, *Eimeria*, equid herpesviruses; *Mycobacterium avium* subsp *paratuberculosis*, *Mycobacterium tuberculosis*, *Nematoda*, *Pasteurella*, rabies virus, *Rhodococcus* bacteria, *Rickettsia*, Rotavirus, *Salmonella* infections, *Sarcoptes scabiei*, *Trypanosoma evansi*.

Zadi-Karam, H; Karam, NE. **Bacteries lactiques du lait de chamelle. [Lactic acid bacteria from camel milk.]** *Rencontres Autour des Recherches sur les Ruminants*. 2005; 12: 399. ISSN: 1279-6530. Note: In French.
Descriptors: camels, camel milk, lactic acid bacteria strains.

2004

Al Ani, Falah Khalil Abdul Razzak (Editors). ***Camel Management and Diseases***. Amman: Dar Ammar Book Pub., c2004. xvi + 455pp. ISBN 9957445006; 9789957445003. Note: With 16 consultant contributors." Includes bibliographical references and index.
NAL call no: SF997.5.C3.A43 2004
Abstract: This is a reference book on camels and includes 30 chapters that deal with the different aspects of camel management and diseases. Most chapters are on the dromedary but there is a chapter on Bactrian camel and one on South American camelids. The book also covers the socio-economics of the camel in nomadic life and the history of the camel in pre-Islamic and in Islamic society, and camel sports. Most of the chapters are devoted to the physiology and diseases of the various body systems, diseases by pathogen type (viral, bacterial, parasitic, and fungal), clinical examination, anaesthesia and surgery, nutrition and digestion, management and husbandry. The text is supported by numerous black and white photographs. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, camel diseases, camel husbandry, camel breeding, camel nutrition, camel physiology, infectious diseases, reproduction, diagnostic techniques, therapy, etc.

Al Gaabary, MH; Mourad, MI. **Seroprevalence of camel brucellosis in the East Governorate of Assiut, Egypt.** *Assiut Veterinary Medical Journal.* 2004; 50(103): 70-74. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: The incidence of camel brucellosis at the Assiut governorate in Egypt was investigated from March 2003 to May 2004. 430 serum samples (312 from camels before slaughtering and 118 samples from camels in contact with farm animals) were analysed using rose Bengal, tube agglutination, mercaptoethanol and Rivanol tests, which yielded 7.67, 8.84, 6.97 and 6.75% positive results, respectively. The high prevalence of brucellosis indicates the importance of this disease in camels. Camel populations must also be considered together with cattle, buffaloes, sheep and goats in controlling the disease.
Descriptors: agglutination tests, brucellosis, *Brucella,* diagnosis, disease prevalence, disease surveys, epidemiological surveys, epidemiology, immunodiagnosis, Rose Bengal Plate Test, serological diagnosis, serological surveys, seroprevalence, Egypt.

Aminu Deen; Dixit, SK; Tuteja, FC; Tanwar, RK; Kataria, AK; Sahani, MS. **Tuberculosis in camels: case report.** *Journal of Camel Practice and Research.* 2004; 11(1): 79-81. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camels, case reports, clinical aspects, diagnosis, hemorrhagic enteritis, histopathology, lymphadenopathy, necrosis, pleurisy, *Mycobacterium tuberculosis*, hemorrhagic entertitis, Rajasthan, India.

Anderson , DE ; Whitehead, C. **Neurological disease in camelids.** *Proceedings of the Thirty Seventh Annual Conference, American Association of Bovine Practitioners, Fort Worth, Texas, USA, 23-25 September, 2004.* 2004; 140-145. ISSN: 0743-0450
Descriptors: dromedary camels, differential diagnosis, heat stress, listeriosis, meningitis, nervous system diseases, neurology, septicemia, blood poisoning, neuropathy.

Bayleyegn Molla; Woubit Salah; Alemayehu, D; Ahmed Mohammed. **Antimicrobial resistance pattern of *Salmonella* serotypes isolated from apparently healthy slaughtered camels (*Camelus dromedarius*) in eastern Ethiopia.** *Berliner und Munchener Tierarztliche Wochenschrift.* 2004; 117(1/2): 39-45. ISSN: 0005-9366. Note: In English with a German summary.
Abstract: A total of 714 samples consisting of faeces, mesenteric lymph nodes, liver, spleen, abdominal and diaphragmatic muscles (each 119) were collected from November 2001 to April 2002 from apparently healthy slaughtered camels (Camelus dromedarius) in eastern Ethiopia. One hundred sixteen (16.2%) Salmonella strains belonging to 16 different serovars were isolated. All Salmonella strains isolated were examined for antimicrobial resistance to 17 selected antimicrobials. The minimum inhibitory concentration (MIC) values were determined by the microdilution broth test. Fifty-two (44.8%) of the Salmonella isolates were resistant to one or more antimicrobials. Thirty-nine of the 52 (75%) resistant Salmonella serovars exhibited multiple resistance to up to eight different antimicrobials. Among the serovars tested, S. Typhimurium, S. Heidelberg, S. Braenderup and S. Hadar displayed multiple resistance mainly to streptomycin (35.3%), spectinomycin (28.4%), sulfamethoxazole (25.0%), ampicillin (24.1%), trimethoprim (22.4%), trimethoprim/sulfamethoxazole (18.9%), tetracycline (12.9%) and colistin (11.2%). All Salmonella strains tested were susceptible to ciprofloxacin, nalidixic acid, gentamicin, kanamycin and neomycin. The present study showed the importance of camels as a potential source of single and multiple resistant Salmonella strains to different antimicrobials that are also used in the public health sector for the treatment of different bacterial diseases in Ethiopia. Reproduced withpermission of CAB.
Descriptors: dromedary camels, *Salmonella typhimurium,*ampicillin, drug resistance, feces, lymph nodes, serotypes, serovars, spectinomycin, streptomycin, sulfamethoxazole, tetracycline, Ethiopia.

Erdenebaatar, J; Bayarsaikhan, B; Yondondorj, A; Watarai, M; Shirahata, T; Jargalsaikhan, E; Kawamoto, K; Makino, S. **Epidemiological and serological survey of brucellosis in Mongolia by ELISA using sarcosine extracts.** *Microbiology and Immunology*. 2004; 48(8): 571-577. ISSN: 0385-5600
Abstract: Brucellosis is an important zoonosis, and serological surveillance is essential to its control. However, cross-reactions of attenuated live cells of *Brucella abortus* strain S-19 and B. melitensis strain Rev-1 with Yersinia enterocolitica O9 or vaccinated animal sera interfere

with accurate serological diagnosis by the Rose Bengal test (RBT). Therefore, we used ELISA with sarcosine extracts from the virulent B. abortus strain 544 to eliminate false-positives among RBT positive-sera. A total of 697 serum samples were collected in Mongolia from humans and animals in 23 nomadic herds. The herds were classified into three groups as brucellosis-endemic (BE), brucellosis-suspected (BS), or *Brucella*-vaccinated (BV). The number of 295 animals (43.0%) was positive by RBT, but 206 (69.8%) of these were positive according to ELISA; therefore, 30.2% of the RBT-positive sera were found to be false positives. The false positive samples for RTB represent 4.1%, 27.4%, and 68.2% of the animals from the BE, BS, and BV herds, respectively. In addition, 32% of RBT-positive human sera were also false positives. Thus, our ELISA would be more specific than RTB and useful for epidemiological surveillance for brucellosis. Reproduced with permission of CAB.
Descriptors: camels, cattle, goats, sheep, yaks, reindeer, humans, *Brucella abortus*, bacterial antigens, bacterial diseases, brucellosis, diagnostic techniques, disease prevalence, ELISA, epidemiology, human diseases, immunodiagnosis, immunological techniques, Rose Bengal test, serological surveys, seroprevalence, seroepidemiology, serological, diagnosis, serological techniques, Mongolia.

Fouad , IA. **Renal diseases in camels.** *Assiut Veterinary Medical Journal.* 2004; 50(101): 156-167. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: A survey of the prevalence and types of renal lesions was carried out on 480 Sudanese camels obtained from Cairo abattoirs in Egypt for 2 years [year not given]. Macroscopic, histopathological and bacteriological examinations of the kidneys were performed. The incidence of total renal lesions was 4.375%, classified into four groups including mesangioproliferative glomerulonephritis (GN, 1.458%), endocapillary proliferative GN (0.416%), embolic GN (0.416%) and interstitial nephritis (2.083%). Different types of bacterial isolates were obtained in some cases, including *Escherichia coli*, *Arcanobacterium pyogenes* and *Proteus mirabilis*.
Descriptors: camels, nephritis, kidney disorders, nephropathy, renal diseases, disease prevalence, disease surveys, epidemiology, glomerulonephritis, histopathology, kidney diseases, *Escherichia coli*, *Arcanobacterium pyogenes* and *Proteus mirabilis*, Egypt.

Gaurav Sharma. **Comparison of serological tests applied in diagnosis of brucellosis in buffaloes and camels.** *Veterinary Practitioner.* 2004; 5(2): 142-144. ISSN: 0972-4036
Descriptors: dromedary camels, buffaloes, brucellosis, *Brucella*, serological diagnosis, testing accuracy, immunodiagnosis, serology.

Ghali , MB ; Scott, PT; Al Jassim, RAM. **Characterization of *Streptococcus bovis* from the rumen of the dromedary camel and Rusa deer.** *Letters in Applied Microbiology*. 2004; 39(4): 341-346. ISSN: 0266-8254
Descriptors: camels, Rusa deer, bacterial pathogen, *Streptococcus bovis*, isolate, characterization.

Gutierrez, C; Schulz, U; Corbera, JA; Morales, I; Tejedor, MT. **Vegetative endocarditis associated with *Escherichia coli* in a dromedary camel.** *Veterinary Research Communications.* 2004 Aug; 28(6): 455-459. ISSN: 0165-7380

Descriptors: dromedary camels, *Escherichia* infections, *Escherichia coli*, endocarditis, case studies, animal diseases, heart valves.

Lenin Bhatt; Anju Chahar; Tuteja, FC; Deepak Verma. **Prevalence, etiology and antibiogram of subclinical mastitis isolates from camel.** *Veterinary Practitioner.* 2004; 5(1): 61-65. ISSN: 0972-4036

Abstract: A total of 100-quarter milk samples from 25 apparently healthy camels were collected and subjected to culture examination to find out the prevalence of subclinical mastitis, and to determine the bacterial isolates associated with subclinical mastitis in camels. The in vitro antibiotic sensitivity pattern against these bacterial isolates was also studied. The prevalence of subclinical mastitis was found to be 41 per cent on quarter basis and 72 per cent on animals basis. Staphylococci were the most prevalent organisms (68.29 per cent) among bacterial isolates followed by Streptococci (19.51 per cent), *Corynebacterium* spp. (7.32 per cent) and *Bacillus* spp. (4.68 per cent). In vitro antibiotic sensitivity of 41 isolates against 10 antimicrobials revealed more than 95 per cent sensitivity for chloramphenicol, ceftriaxone, amoxycillin, cloxacillin, enrofloxacin and ciprofloxacin. Reproduced with permission of CAB.

Descriptors: dromedary camels, subclinical mastitis, udder quarters, camel milk, bacterial isolates, etiology, *Corynebacterium*, *Staphylococcus*, Streptococcaceae, amoxicillin, chloramphenicol, ciprofloxacin, cloxacillin, enrofloxacin, disease prevalence, drug resistance.

Mitiku,E; Asmare, AA. **The prevalence and cause of camel mastitis (*Camelus dromedarius*) in Errer valley, Eastern Ethiopia.** *Folia Veterinaria.* 2004; 48(2): 95-99. ISSN: 0015-5748

Abstract: A total of 115 lactating camels were evaluated. Grade 3 and above CM test reactions were considered mastitis positive. Sixteen camels (13.91%) were affected by clinical mastitis and eighteen (15.65%) by subclinical mastitis. Of the sixteen identified blocked quarters, five quarters of three camels (2.61%) were not associated with other mastitis positive quarters of the udder. All blocked quarters had a previous history of mastitis. Therefore, in this study a total prevalence rate of 32.17% was detected. Out of 50 CM test positive quarters, 34 were graded as 3, 12 as 4 and 4 as 5. California mastitis test scores of 1, 2, 3, 4 and 5 yielded average cell counts of 97 000, 333 000, 1 150 000, 3 100 000, and 13 900 000, respectively. The bacteriological examination of CM test positive quarters revealed that *Staphylococcus aureus*, coagulase negative staphylococcus and *Pasteurella haemolytica* were the important causative agents of camel mastitis. In grade 3 and 4 CM test reactions, *Pasteurella haemolytica* and *Staphylococcus aureus* caused the highest mean cell count of 1 325 000+or-200 000 and 1 520 000+or-200 000, respectively. Therefore, although camels are reported to be relatively resistant to mastitis, this study revealed an apparently high prevalence of mastitis in camels managed traditionally by pastoralists. Moreover, most of the causative agents are of public health significance. Therefore mastitis in camels must be given special attention. Reproduced with permission of CAB.

Descriptors: dromedary camels, lactating camels, mastitis, subclinical mastitis, *Pasteurella haemolytica, Staphylococcus aureus,* etiology, disease prevalence, disease surveys, epidemiology, public health, somatic cell count, zoonoses, Abyssinia, Ethiopia.

Molla, B; Mohammed, A; Salah, W. ***Salmonella* prevalence and distribution of serotypes in apparently healthy slaughtered camels (*Camelus dromedarius*) in Eastern Ethiopia.** *Tropical Animal Health and Production.* 2004; 36(5): 451-458. ISSN: 0049-4747. Note: In English with a Spanish and French summary.
DOI: http://dx.doi.org/10.1023/B:TROP.0000035013.01459.c9
Abstract: The present study was undertaken to determine the prevalence and distribution of *Salmonella* from apparently healthy slaughtered camels in Eastern Ethiopia. A total of 714 samples (faeces, mesenteric, lymph nodes, spleen, liver, abdominal and diaphragmatic muscles) from 119 slaughtered camels were analysed. Salmonellae were detected from 116 (16.2%) of the 714 samples examined. Eighteen (15.1%) faeces, 19 (15.9%) mesenteric lymph nodes, 14 (11.8%) livers and 17 (14.3%) spleen samples (n=119 for each) were positive for Salmonella. Salmonellae were found in 20.1% of the abdominal and diaphragmatic muscles. A total of sixteen different serotypes were identified of which *Salmonella saintpaul* (38.8%) and *S. braenderup* (22.4%) were the most prevalent followed by *S. muenchen* (8.6%), *S. kottbus* (6.0%) and *S. havana* (5.2%). Other serotypes, including *S. typhimurium*, *S. heidelberg* and *S. enteritidis* were also detected from Ethiopian camels.
Descriptors: dromedary camels, healthy, abattoirs, post slaughter sampling, *Salmonella*, *Salmonella enteritidis,Salmonella typhimurium, Salmonella braenderup*, *Salmonella Havana*, *Salmonella Heidelberg*, *Salmonella Kottbus*, *Salmonella muenchen*, *Salmonella saintpaul*, serotypes, salmonellosis, disease distribution, disease prevalence, disease surveys, epidemiology, feces, liver, lymph nodes, muscles, spleen, Abyssina, Ethiopia.

Moustafa, AH. **Study of some aerobic bacterial causes of respiratory diseases in slaughtered camels in Dakahlia Governorate.** *Assiut Veterinary Medical Journal.* 2004; 50(102): 95-105. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: A total of 255 samples (85 each of lung, lymph nodes and tracheal swabs) from 85 slaughtered camels in an abattoir in Dakahlia, Egypt, were subjected to bacteriological examinations [date not given]. It was shown that 25 camels had respiratory diseases while the rest were apparently normal. The bacteriological examinations revealed that 118 (46.27%) of the examined samples were positive for bacterial isolates, 52 (28.88%) and 66 (88%) positive samples from apparently normal and diseased animals, respectively. 154 bacterial isolates could be detected and classified into 90 (58.44%) Gram positive and 64 (41.56%) Gram negative bacteria. The main bacterial isolates were 22 (18.64%) *Staphylococcus aureus*, *Corynebacterium pyogenes* [*Arcanobacterium pyogenes*] and *Escherichia coli*; 16 (13.55%) *Streptococcus pyogenes*, *Staphylococcus epidermidis* and *Klebsiella pneumoniae*; 14 (11.86%) *Streptococcus pneumoniae*; 10 (8.47%) *Pasteurella multocida;* 8 (6.78%) *Pseudomonas aeruginosa* 6 (5.08%) *Pasteurella haemolytica* [*Mannheimia haemolytica*] and 2 (1.69%) *Proteus vulgaris*. The pathogenicity test for *Pasteurella multocida* isolates indicated that all isolates were pathogenic. Sensitivity test for the isolated bacteria revealed that most of isolates were highly sensitive to enrofloxacin, gentamicin and rimactan and resistant to streptomycin and ampicillin.
Descriptors: dromedary camels, post slaughter sampling of lung, lymph nodes and tracheal swabs, respiratory diseases, *Staphylococcus aureus*, *Corynebacterium pyogenes* [*Arcanobacterium pyogenes*], *Escherichia coli*, *Streptococcus pyogenes*, *Staphylococcus epidermidis*, *Klebsiella pneumoniae*, *Streptococcus pneumoniae*, *Pasteurella multocida, Pseudomonas aeruginosa*, *Pasteurella haemolytica* [*Mannheimia haemolytica*], *Proteus vulgaris*, ampicillin, antibacterial agents,

disease prevalence, disease surveys, drug resistance, enrofloxacin, gentamicin, streptomycin, epidemiological surveys, epidemiology, gentamicin, rimactan, ampicillin, multiple drug-resistance, pathogenicity, susceptibility.

Qureshi, S; Kataria, AK. **In vitro evaluation of efficacy of some antibiotics against *Staphylococcus aureus* and other bacterial microflora isolated from skin wounds and abscesses in camel.** *Journal of Camel Practice and Research.* 2004; 11(1): 67-71. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted to investigate the efficacy of some antibiotics against bacteria, with special reference to *Staphylococcus aureus* isolated from wounds and abscesses in the skin of camels. A total of 70 pus samples from male camels were collected. Most of the Gram positive isolates were sensitive to amoxicillin, cotrimoxazole, trimethoprim, gentamicin, streptomycin, chloramphenicol, kanamycin, doxycycline hydrochloride, ciprofloxacin and neomycin. The intermediate zone of inhibition of Gram positive isolates was recorded with erythromycin. Majority of these organisms were resistant to penicillin, ampicillin, bacitracin, lincomycin, sulfamethizole and sulfadiazine. Most of the Gram negative isolates were sensitive to ampicillin, chloramphenicol, gentamicin, norfloxacin, trimethoprim and ciprofloxacin. An intermediate response to tetracycline and kanamycin was recorded for these isolates. In general, these isolates were resistant to sulfamethizole and polymyxin B. The most effective drug for both Gram positive and Gram negative isolates were gentamicin, chloramphenicol, ciprofloxacin and trimethoprim. Based on the antibiogram results, it was deduced that furazolidone, chloramphenicol, gentamicin and cloxacillin could be used to contain the *S. aureus* infection in wounds and abscesses in camel. Gram positive organisms were resistant to ampicillin. In contrast, this drug was able to inhibit the growth of most of the Gram negative bacteria. Sulfadiazine was ineffective to most of the Gram positive and all of the Gram negative bacteria. Reproduced with permission of CAB.
Descriptors: dromedary camels, skin lesions, abscesses, wounds, Gram negative bacteria, Gram positive bacteria, *Staphylococcus aureus*, treatments, antibiotics, antibiotic resistance, amoxicillin, ampicillin, bacitracin, chloramphenicol, ciprofloxacin, cloxacillin, doxycycline, erythromycin, furazolidone, gentamicin, kanamycin, lincomycin, neomycin, norfloxacin, penicillins, polymyxin B, streptomycin, sulfadiazine, tetracycline, trimethoprim, achromycin, amoxicillin, cotrimoxazole, lincocin, sulphadiazine.

Rahman, MB; Hasan, NM; Siddique, AB; Rahman, MM; Chowdhury, KA. **Prevalence of bacteria in upper respiratory tract of zoo herbivores.** *Bangladesh Veterinarian*. 2004; 21(1): 14-17. ISSN: 1012-5949
Abstract: Prevalence of upper respiratory tract bacteria in 55 herbivorous animals of the following families was studied during June 1991 to July 1992 using traditional bacteriological techniques: Bovidae, Cervidae, Hippopotamidae Giraffidae, Suidae, Camelidae, Tapiridae and Equidae. The animals lived in Dhaka Zoological Gardens and had no apparent respiratory problem. The bacteria isolated were Staphylococcus aureus (100.0%), Streptococcus spp. (25.5%), Pasteurella multocida (16.4%), Pasteurella haemolytica (16.4%), Escherichia coli (7.3%), Pseudomonas spp. (3.6%) and Arcanobacterium spp. (1.8%). Reproduced with permission of CAB.
Descriptors: dromedary camels, zoo animals, herbivores, Bovidae, Cervidae, Hippopotami-

dae, Giraffidae, Suidae, Camelidae, Tapiridae, Equidae, upper respiratory tract infections, disease prevalence, *Arcanobacterium*, *Pasteurella haemolytica*, *Pasteurella multocida*, *Pseudomonas*, *Staphylococcus aureus*, *Streptococcus*.

Schelling, E; Diguimbaye, C; Daoud, S; Nicolet, J; Zinsstag, J. **Seroprevalences des maladies zoonotiques chez les pasteurs nomades et leurs animaux dans le Chari-Baguirmi du Tchad.[Seroprevalences of zoonotic diseases in nomads and their livestock in Chari-Baguirmi, Chad.]** *Medecine Tropicale*. 2004; 64(5): 474-477. ISSN: 0025-682X. "Nomades au Tchad: proceedings of a workshop held at N'Djamena, Chad, November 2002." Note: In French with an English summary.

Abstract: The seroprevalences of brucellosis and Q-fever were evaluated in humans and livestock in three Chadian nomadic communities, i.e., Fulani cattle breeders and Arab camel and cattle breeders. The survey was carried out in 1999 and 2000. The total number of human sera and animal sera tested were 911 and 1637, respectively, for antibodies against *Brucella* spp. and 368 and 613, respectively, for *Coxiella burnetii*. Sixteen brucellosis positive human sera resulted in a seroprevalence rate of 2%. Male participants were significantly more often brucellosis seropositive than females. No association was found between brucellosis serostatus and physical findings or reported symptoms. Positive brucellosis serology was more frequent in cattle (seroprevalence, 7%) than in camels (1.4%) and small ruminants (0.5%). Fifteen human sera from 11 Arab camel breeders and 4 Arab cattle breeders were positive for Q-fever (seroprevalence below 1%). Being a camel breeder was a significant risk factor for Q-fever seropositivity. Camels had the highest Q-fever seroprevalence (73%) among livestock species. Reproduced with permission of CAB.

Descriptors: nomadic people, humans, cattle, camels, ruminants, women, men, sex differences, antibodies, *Brucella,* brucellosis, epidemiology, Q fever,*Coxiella burnetii*, seroprevalence, zoonoses, abattoir fever, Balkan grippe, Derrick Burnet disease, Nine Mile fever, pneumorickettsiosis, quadrilateral fever, query fever, Tchad, zoonotic infections, Chad.

Seleim, RS; El Sebaey, WAF. **Camel-calves diarrhoea instigated by *Escherichia coli* and detection of some virulence-associated markers.** *Veterinary Medical Journal Giza.* 2004; 52(2): 153-163. ISSN: 1110-1423

Abstract: Bacteriological examination of internal organ specimens including the intestines, liver, spleen, lungs and kidneys (45) and faecal samples (77) from necropsied and diarrhoeic camel-calves, respectively, that had severe episodes of diarrhoea, revealed the isolation of E. coli from 33 of 45 (73.3%) of the necropsied specimens and 58 of 77 (75.3%) faecal samples. Eleven serogroups were detected, with high prevalence of O3 (19.8%), O11 (17.6%), O80 (16.5%). Two enterohaemorrhagic, enterotoxigenic O157 isolates (2.2%) were also detected one from each group of specimens. *E. coli* isolation from faecal specimens revealed wider serogroups range as O91, O125 and O29 were additionally detected from faecal samples and not from the organ specimens. Investigating some virulence markers of the isolates revealed that the haemolytic activity was expressed significantly higher (P<0.01) than the rest of investigated markers as 43 of 91 (47.3%) were haemolysin producers. The detection of the VT2 gene was revealed in 34 of 91, (37.4%), Shiga-like toxin production in 26 of 91, (28.6%) and Congo red binding affinity was expressed in 31 of 91 (34.1%) of the isolates. The highest percentage of hydrophobic activity was (81.2+or-5.7) by the O163

isolates, whereas the lowest activity (40.2+or-3.2) was recorded by the O125 isolates. It was observed that the highest expression of virulence markers was among the isolates of O157 (2 isolates), O26 (3 isolates) and O163 (2 isolates), as these isolates expressed full range of the investigated virulence markers. The rest of *E. coli* isolates from other serogroups revealed abridged virulence criteria. Antibiotic sensitivity testing of *E. coli* revealed highest sensitivity against gentamicin (94.4%), trimethoprim sulfamethoxazole (91.2%), streptomycin (87.9%) and cephalosporin (84.6%). In conclusion, highly virulent *E. coli* strains induced infection in camel-calves, and their treatment with the recommended antibiotics could curb the episode of the diarrhoea in a few days.
Descriptors: dromedary camels, *Escherichia coli*, bacterial virulence, diarrhea, fecal testing, drug resistance, organs.

Tejedor, MT; Martin, JL; Corbera, JA; Shulz, U; Gutierrez C. **Pseudotuberculosis in dromedary camels in the Canary Islands.** *Tropical Animal Health and Production.* 2004 July; 36(5): 459-462. ISSN: 0049-4747
Descriptors: dromedaries, *Corynebacterium pseudotuberculosis*, caseous lymphadenitis, lymph nodes, pathogen identification, abscess, serotypes, strain differences, antibiotic resistance, Spain.

Wernery, U; Ul Haq, A; Joseph, M; Kinne, J. **Tetanus in a camel (*Camelus dromedarius*) - a case report.** *Tropical Animal Health and Production.* 2004; 36(3): 217-224. ISSN: 0049-4747.
Note: In English with a Spanish and French summary.
DOI: http://dx.doi.org/10.1023/B:TROP.0000016835.02928.28
NAL call no : SF601.T7
Abstract: Twenty days after an open castration, a 5-year-old dromedary was presented to the Dubai Camel Hospital with severe central nervous symptoms. The dromedary showed the following signs: off feed, stiff gait with extended neck, external swelling of the preputial sheath and groin region, and foamy saliva drooling from the mouth. The dromedary was unable to swallow. Three days after admission, the camel developed lockjaw, and on the fifth day it was unable to stand owing to paralysis of the hindquarters. Because of the severity of the disease and because it did not respond to treatment, the camel was euthanized 26 days after the operation and submitted to the Central Veterinary Research Laboratory for further investigation. Both castration wounds were closed and spermiducts were filled with necrotic masses from which Clostridium tetani was isolated. Two mice, which were injected with the filtrate of the thioglycolate broth, developed typical signs of tetanic spasm of the hind leg. Faecal samples from camel and horse paddocks that were only 50 metres apart were negative for C. tetani. However, C. tetani was isolated from two soil samples of the horse paddock. It is recommended that camels should be vaccinated against tetanus prior to castration.
Descriptors: dromedary camels, *Clostridium tetani,* lockjaw, clinical picture, antitoxins, case reports, castration, clinical aspects, disease prevention, postoperative complications, tetanus, toxins, vaccination.

Arabian: Physiology

2009

Nazifi, S; Mansourian, M; Nikahval, B; Razavi, SM. **The relationship between serum level of thyroid hormones, trace elements and antioxidant enzymes in dromedary camel (*Camelus dromedarius*).** *Tropical Animal Health and Production.* 2009; 41(1): 129-134. ISSN: 0049-4747
NAL call no : SF601.T7
Descriptors: healthy dromedary camels, base serum values, thyroid homones, role in metabolic pathways, erythrocyte antioxidant enzyme activities, seum profiles of trace elements, SOD and GPX activity, zinc, copper, manganese, iron selenium, Iran.

2008

Abu Damir, H.; Abbas, TA; Ali, M Alhaj. **Copper status in breeding and racing camels (*Camelus dromedarius*) and response to cupric oxide needle capsules.** *Tropical Animal Health and Production.* 2008; 40(8): 643-648. ISSN: 0049-4747
NAL call no : SF601.T7
Descriptors: dromedary camels, late stage pregnancy, lactation, breeding camels, camel calves, racing camels, copper deficiency, copper status, blood sampling, comparison study, oral administration, cupric oxide, needle capsule formation, Rhodes grass for feed.

Al Hommadi, A; Shamsi, FA; Al Rajhi, AA. **The biochemical properties of non-stimulated tears from camels (*Camelus dromedarius*).** *FEBS Journal.* 2008; 275(Suppl. 1): 430. ISSN: 1742-464X (print); 1742-4658 (electronic). Note: "Joint Conference of the 33rd FEBS Congress/11th IUBMB Conference, Athens, Greece; June 28-July 03, 2008."
URL: http://www.febsjournal.org/
Descriptors: dromedary camels, tears, biochemical properties of camel tears, glucose, cholesterol, carbon dioxide, lactate dehydrogenase, calcium ion, glutathione, iron ion, magnesium ion, phosphate ion, dry eye syndrome, eye diseases, osmolarity, protein content of tears.

Ali, SA; Omer, SA; El Bashir, SM; Turkey, IY; Barakat, SM. **Serum biochemical values of Sudanese stabled and grazing camels (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal.* 2008; 54(117): 190-196. ISSN: 1012-5973.
Abstract: In this study, the concentrations of some blood biochemical constituents were determined in a group of 12 stabled and 12 naturally grazing camels in the area of Abu Deleig, Northeast Khartoum, Sudan. All animals have been subjected to careful clinical and laboratory examinations to ensure their healthy status. A significant variation was observed in serum glucose ($P<0.01$) concentration and in serum uric acid concentration ($P<0.05$), between the blood of the two groups. The stabled animals obtained the highest glucose concentration while the grazing animals obtained higher uric acid value than the stabled group.

No significant variation was observed in the mean values of total protein, albumin, urea, uric acid, total bilirubin, creatinine, ALT, AST or ALP. The values obtained in this study were compared with the findings reported by other workers in camels.
Descriptors: dromedary camels, blood chemistry, blood picture, blood sugar, blood glucose, grazing, normal values, uric acid.

Ali, Shujait; Ahmad, Nazir; Akhtar, Nafees; Zia ur Rahman; Noakes, David E. **Metabolite contents of blood serum and fluid from small and large sized follicles in dromedary camels during the peak and the low breeding seasons.** *Animal Reproduction Science.* 2008; 108(3-4): 446-456. ISSN: 0378-4320
Descriptors: dromedary camels, normal females, young camels, adult camels, blood serum, small and large follicles, follicular fluids, biochemical metabolites, low and peak breeding season comparison study, glucose, cholesterol, albumin, triglycerides.

Aminu Deen. **Testosterone profiles and their correlation with sexual libido in male camels.** *Research in Veterinary Science.* 2008; 85(2): 220-226. ISSN:
NAL call no: 41.8 R312
Abstract: The study was conducted on 4 male Jaisalmeri camels (*Camelus dromedarius*) on their circulating testosterone (T) profiles and correlation with sexual libido. The average T concentration was low during hot months of April to September, started increasing in the months of October and November, continued to increase steadily in the months of December, January and February followed by decline in the ensuing months. Individual variations in onset and cessation of T surge were observed. Sexual libido as indicated by copulation time (CT) and volume of semen ejaculated (V) was high during January to April months, declined slowly over May month followed by complete cessation in later half of June. Sexual libido was almost negligible during July to November months. The sexual libido was also low during December month. Like circulating T profiles, individual variations were also observed in sexual libido. Data indicated that onset as well as cessation of T surge preceded the onset and cessation of sexual libido in all the animals. A positive correlation was found among circulating T (concentration), CT and V of semen. It is concluded that seasonal changes in circulating testosterone governs sexual libido in male camels. Reproduced with permission from CAB.
Descriptors: dromedary camels, Jaisalmeri breed, males, copulation, coitus, libido, testosterone levels, seasonal variations, semen levels.

Ansari-Renani, HR. **Seasonal hair follicle cycle of *Camelus dromedarius*.** *Pakistan Journal of Biological Sciences.* 2008; 11(3): 410-415. ISSN: 1028-8880
Abstract: This experiment was conducted to identify the annual changes in hair follicle activity, changes at the follicular level and to characterize some of the fibre-follicle characteristics of camels at different ages. A total of 28 camels were allocated at random on the basis of age to one of four groups (2, 4, 6 and older than 8 years). All groups of camels were fed a maintenance level of ration throughout the experiment. To determine hair follicle cycle and other follicle characteristics samples of skin were taken using a trephine from the right midside of animals at approximately 28 day intervals for a period of 12 months. Using a small hand

clipper, 15 g of fibre sample was taken from the left midside region to determine fibre characteristics. Analysis of variance was performed using a one-way SAS package and the means and the standard deviations of means were generated with this program. Mean S/P ratio, primary and secondary and total follicle densities of all groups of camels were 6.85+or-0.75, 3.76+or-0.63, 22.29+or-3.57 and 25.33+or-3.85, respectively. Mean fibre diameter, percentage of medullated and non-medullated fibre and clean wool percentage of all groups were 18.98+or-1.64, 18.10+or-1.65, 81.89+or-6.98 and 77.58+or-4.58, respectively. Mean percentage of active primary follicles significantly ($p<0.05$) decreased to lowest in February to a minimum of 83.1%, then significantly ($p<0.05$) increased over spring. Secondary follicle activity decreased over winter and spring to a minimum of 60% in February.
Descriptors: dromendary camels, skin sampling, hair analysis, hair follicles, hair growth, follicle densities, seasonal variation, age differences.

Asadi, F; Shahriari, A; Asadian, P; Pourkabir, M; Samadaei, M. **Composition and electrophoretic mobility of plasma lipoproteins of dromedary camels (*Camelus dromedarius*).** *American Journal of Veterinary Research.* 2008; 69(7): 880-885. ISSN: 0002-9645
URL: http://www.avma.org/journals/default.asp
NAL call no: 41.8 Am3A
Abstract: Objective - To determine the lipid composition and electrophoretic pattern of plasma lipoproteins in samples obtained from healthy 1-humped camels (*Camelus dromedarius*). Animals - 34 healthy camels raised under similar farming and dietary conditions. Procedures - Plasma samples were subjected to density-gradient ultracentrifugation for separation of plasma lipoproteins, including very-low-density lipoproteins (VLDL), low-density lipoproteins (LDL), and high-density lipoproteins (HDL). Purity of the separation was assessed by use of polyacrylamide gel disk electrophoresis. Concentrations of triglycerides, cholesterol, and phospholipids were measured in each lipoprotein fraction, and lipoprotein electrophoretic patterns were determined in plasma samples. Results - Phospholipid was the major constituent of VLDL (mean+or-SD concentration, 10.62+or-1.2 mg/dL), LDL (24.66+or-3.12 mg/dL), and HDL (38.08+or-0.76 mg/dL). Low-density lipoprotein, VLDL, and HDL were important plasma lipoprotein carriers for cholesterol (67.94+or-9.51%), triglyceride (55.83+or-7.81%), and phospholipid (51.91+or-1.55%), respectively. On the basis of electrophoresis results, relative percentages of alpha - and beta -lipoproteins were 31.72+or-4.88% and 68.3+or-4.68%, respectively. Conclusions and Clinical Relevance - The lipoprotein profile in 1-humped camels differed substantially from that of other ruminants. Results may be useful in the evaluation of metabolic disorders in camels.
Descriptors: dromedary camels,blood chemistry, blood plasma, blood proteins, cholesterol, composition, diets, electrophoresic mobility, evaluation, lipids, lipoproteins, metabolic disorders, phospholipids, triglycerols, metabolic diseases; triglycerides.

Baars, RMT; Kebebew, T. **Milk production performance of pastorally managed camels in eastern Ethiopia.** *Tropical Agriculture*. 2005; 82(3-4): 197-203. ISSN: 0041-3216
Descriptors: dromedary camels, 30 lactating females, 19 month monitoring, pastured camels, effects of season, parity effects calf survival, mean daily milk yield, peak milk yield, total lactation yield, lactation length, days open, calving interval, eastern Ethiopia.

Deen, A. **Testosterone profiles and their correlation with sexual libido in male camels.** *Research in Veterinary Science.* 2008 Oct; 85(2): 220-226. ISSN: 0034-5288
DOI : http://dx.doi.org/10.1016/j.rvsc.2007.10.012
NAL call no: 41.8 R312
Abstract: The study was conducted on 4 male Jaisalmeri camels (*Camelus dromedarius*) on their circulating testosterone (T) profiles and correlation with sexual libido. The average T concentration was low during hot months of April to September, started increasing in the months of October and November, continued to increase steadily in the months of December, January and February followed by decline in the ensuing months. Individual variations in onset and cessation of T surge were observed. Sexual libido as indicated by copulation time (CT) and volume of semen ejaculated (V) was high during January to April months, declined slowly over May month followed by complete cessation in later half of June. Sexual libido was almost negligible during July to November months. The sexual libido was also low during December month. Like circulating T profiles, individual variations were also observed in sexual libido. Data indicated that onset as well as cessation of T surge preceded the onset and cessation of sexual libido in all the animals. A positive correlation was found among circulating T (concentration), CT and V of semen. It is concluded that seasonal changes in circulating testosterone governs sexual libido in male camels.
Descriptors: dromedary camels, 4 male Jaisalmeri camels, circulation testosterone profile, sexual libido, seasonal variations, testosterone surges and cessation, copulation, semen levels.

El Allali, Khalid; Sinitskaya, Natalia; Bothorel, Beatrice; Achaaban, Rachid; Pevet, Paul.; Simonneaux, Valerie. **Daily aa-nat gene expression in the camel (*Camelus dromedarius*) pineal gland.** *Chronobiology International.* 2008; 25(5): 800-807. ISSN: 0742-0528
Descriptors: dromedary camels, sheep, primates, cows, rodents, species comparison, pineal gland enzyme, arylalkylamine N-acetyltransferase (AA-NAT), synthesis of melatonin, rhythm control, gene expressions, daily fluctations.

El Khawas, KM; El Wahab, MAA; Abo Elmagd, MK. **Selenium levels in blood serum, liver, kidney and muscles of animals slaughtered in Ismailia slaughterhouse.** *Assiut Veterinary Medical Journal.* 2008; 54(117): 252-260. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: The level of selenium was determined in the serum and tissues (liver, kidney and muscles) of 246 animals (73 cows, 74 buffaloes, 37 camels and 62 sheep and goats), aged less than 1 year to 7 years old (1.5-6 for cows, <1-7 for buffaloes, 3-7 for camels and 1-4 for sheep & goats), slaughtered at the Ismailia slaughterhouse (Egypt, date not given). Serum selenium levels did not differ significantly ($P>0.05$) between sexes except for sheep and goats, where females had significantly higher levels than males ($P<0.05$). Low serum selenium level was observed in 95.9% of the buffaloes, 82.9% of the cows, 100% of the camels and 90.9% of the sheep and goats. Tissue selenium levels in females were significantly ($P<0.05$) higher than male in buffaloes, sheep and goats, but not in cows ($P>0.05$). Concerning the level of selenium in the liver, all cows, sheep and goats and 66.7% of the buffaloes had low levels. No distinct symptoms of nutritional myopathy were observed in the slaughtered animals. Most of the animals slaughtered in Ismailia slaughterhouse showed low levels of selenium and need

to be supplemented with selenium in their ration.
Descriptors: buffaloes, cattle, cows, dromedary camels, goats, sheep, abattoirs, slaughter houses, post slaughter sampling, blood chemistry, blood serum, kidneys, muscles, mineral content, selenium, sex differences, species differences, tissue distribution, Egypt.

Gader, Abdel Galil M Abdel; Al Ghumlas, Abeer K; Hussain, Mansour F; Al Haidari, Ahmed; White, James G. **The ultrastructure of camel blood platelets: A comparative study with human, bovine, and equine cells.** *Platelets* (Abingdon). 2008; 19(1): 51-58. ISSN: 0953-7104
Descriptors: camels, bovine, human, comparative study, platelets, morphological differences, shape, size, cytoplasm structure.

Haddadin, MSY; Gammoh, SI; Robinson, RK. **Seasonal variations in the chemical composition of camel milk in Jordan.** *Journal of Dairy Research* . 2008 Feb; 75(1): 8-12. ISSN: 0022-0299
DOI: http://dx.doi.org/10.1017/S0022029907002750
NAL call no: 44.8 J823
Abstract: The principal chemical components of milk from the Arabian camel (*Camelus dromedarius*) were monitored in Jordan over one year. The analyses included total solids, fat, protein, vitamins, minerals and organic acids. Large seasonal variations in total solids and fat were apparent, with maxima in mid-winter of 139 and 39p”0 g/l, respectively, and minima in August of 102 and 25p”0 g/l. These differences may be sufficient to alter the sensory properties of the milk, and the fat: casein ratio may need standardisation for cheesemaking. The mean values of trace elements like zinc (5p”8 mg/l), iron (4p”4 mg/l) and manganese (0p”05 mg/l) in Jordanian camel milk could provide valuable additions to the diet of urban populations, as could the mean concentration of vitamin C (33 mg/l). The levels of organic acids were generally higher than in bovine milk and, as with all the constituents of the milk, there were discernible patterns linking concentration and season of the year.
Descriptors: dromedary camels, camel milk, milk composition, seasonal variation, chemical composition, milk analysis, manganese, Jordan.

Honda, Toshio; Anonymous; Akahori, Yasushi; Kurosawa, Yoshikazu. **Methods of constructing camel antibody libraries**. *Official Gazette of the United States Patent and Trademark Office Patents.* 2008, ISSN: 0098-1133
URL: http://www.uspto.gov/web/patents/patog/
Abstract: The present invention provides camel antibody libraries that maintain in vivo diversity of camelid antibody variable region genes. The in vivo diversity of antibody variable region genes can be accomplished by, for example, mixing genes derived from a plurality of animals or modifying gene amplification conditions. Conventional methods yield only VHHs with limited repertoire diversity. However, the present invention provides libraries comprising genes encoding functional VHHs with sufficient repertoire size. According to the present invention, libraries that enable to freely obtain VHHs against arbitrary antigens are provided. VHHs have excellent solubility and stability, and show a reactivity that usually cannot be expected from tetrameric IgGs.
Descriptors: camel antibody library, methods, techniques, genes coding functional VHHs, repertoire size, tetrameric IgGs.

Konuspayeva, G; Lemarie, E; Faye, B; Loiseau, G; Montet, D. **Fatty acid and cholesterol composition of camel's (*Camelus bactrianus*, *Camelus dromedarius* and hybrids) milk in Kazakhstan.** *Dairy Science and Technology*. 2008; 88(3): 327-340. ISSN: 1958-5586. Note: In English with summaries in Chinese and French.
URL: http://www.dairy-journal.org
Abstract: The fatty acid composition and cholesterol content of 22 camel's milk samples from different regions of Kazakhstan were determined, in different seasons and with different camel species (Bactrian, dromedary and hybrids). Camel milk fat differed from mammalian fats by its high content of the long-chain fatty acids C14:0, C16:0, C18:0 and C18:1. Great differences in fatty acid composition occurred between regions. Short-chain fatty acids (C8:0 and C10:0) were in higher proportion in spring and long-chain fatty acids (C17:0 and C17:1) in autumn. Dromedary milk had a higher proportion of C17:0iso and C18:1 than Bactrian milk. The ratio of unsaturated/saturated acid was more favorable in camel's milk compared with that of cows or other mammalians. All of these parameters gave a nutritional advantage to camel's milk, although it had a higher content of cholesterol (37.1 mg 100 g-1) than cow's milk. Multivariate analysis allowed the identification of four types of fatty acid profiles with a clear opposition between the samples rich in short-chain fatty acids and the samples rich in long-chain fatty acids. These results confirmed that environmental and farming conditions allowed modulation of the lipid composition of camel's milk. Reproduced with permission of CAB.
Descriptors: cows, dromedary camels, Bactrian camels, camel milk, composition, cholesterol levels, milk fats, fatty acids, hybrids, lipids, short chain fatty acids, butterfat, Central Asia, Kazakhstan.

Mace, Matthias; Crouau Roy, Brigitte. **A highly polymorphic insertion in the Y-chromosome amelogenin gene can be used for evolutionary biology, population genetics and sexing in Cetacea and Artiodactyla.** *BMC Genetics.* 2008; 9: Article No.: 64. ISSN: 1471-2156
Descriptors: evolutionary biology, hippocampuses, camels, pigs, markers on the Y chromosome, gender-dependent polymorphism, amelogenin gene, population-based genetics, multiple uses, gender determination, evolutionary genetics, reproductive technologies, forensic science.

Mohamed, HE. **Factors affecting the plasma lipid status in camels (*Camelus dromedarius*).** *Research Journal of Biological Sciences.* 2008; 3(4): 444-445. ISSN: 1815-8846
Abstract: The present study was undertaken to investigate the effect of age, sex and breed on plasma lipids and lipoprotein in camels (*Camelus dromedarius*). Significant variations in cholesterol, triglyceride and total lipids were observed between neonates, yearling and adult groups of camel. Adult have higher cholesterol (1.59+or-0.38 mmol/litre), triglyceride (1.02+or-0.1 mmol/litre) and total lipid (6.7+or-1.21 g/litre). The neonate cholesterol, triglyceride and total lipid were 1.04+or-0.032 mmol/litre, 0.71+or-0.09 mmol/litre, and 5.24 g/litre, respectively. However, the corresponding levels for yearling were 1.18+or-0.21 mmol/litre, 0.83+or-0.08 mmol/litre, and 5.50+or-1.05 g/litre, respectively. Breed-related differences were evident; Arabi camels showed higher lipid status than Anafi. Cholesterol, triglyceride and total lipids were 1.49+or-0.21 mmol/litre, 1.09+or-0.18 mmol/litre, and 6.69+or-1.10 g/litre in Arabi, and 0.91+or-0.30 mmol/litre, 0.81+or-0.20 mmol/litre and

4.42+or-1.09 g/litre in Anafi, respectively. Sex showed insignificant effect on lipid status. Reproduced with permission of CAB.
Descriptors: dromedary camels, adults, blood lipids, breed differences, cholesterol, newborn animals, sex differences, age differences, triacylglycerols, triglycerides.

Mohamed, HE. **Vitamin D status in camels (*Camelus dromedarius*).** *Research Journal of Biological Sciences.* 2008; 3(4): 446-447. ISSN: 1815-8846
Abstract: A study was undertaken to investigate the effects of age, season and breed on plasma vitamin D3 concentrations in Sudanese camels (*Camelus dromedarius*). A total of 1786 camels, of which 1285 were Arabi and 501 were Anafi camels, were used in this one-year field survey in Sudan. Plasma vitamin D3 concentrations showed significant seasonal variations, the highest levels were detected in February-July, whereas lowest levels were noted in August-January. The seasonal reduction in vitamin D3 levels was significantly greater in neonates and yearling camels. There was an association between plasma vitamin D and season, irrespective of age. The correlation coefficients were 0.52, 0.73 and 0.80 for neonates, yearlings and adult camels, respectively. Age group did not affect vitamin D3 plasma levels. Owing to the difference in coat colour, Arabi camels had higher vitamin D3 levels than Anafi camels irrespective of season. Reproduced with permission of CAB.
Descriptors: dromedary camels, Arabi camels, Anafi camels, breed differences, cholecalciferol, vitamin D3, seasonal variation, young animals, Sudan.

Mohri, M; Moosavian, HR; Hadian, MJ. **Plasma biochemistry of one-humped camel (*Camelus dromedarius*): Effects of anticoagulants and comparison with serum.** *Research in Veterinary Science.* 2008; 85(3): 554-558. ISSN: 0034-5288
URL: http://www.sciencedirect.com/science/journal/00345288
NAL call no: 41.8 R312
Descriptors: dromedary camels, healthy camels, plasma biochemistry, effects of anticoagulants, comparison study, in vitro study, glucose, cholesterol, triglyceride, total bilirubin, urea, creatinine, total protein, albumin, calcium, inorganic phosphorus, magnesium, chloride, aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), creatine kinase (CK) and gamma glutamyl transferase (GGT).

Omer, RH; Eltinay, AM. **Chemical composition of camel's colostrum and milk in United Arab Emirates.** *Arab Universities Journal of Agricultural Sciences*. 2008; 16(1): 127-134. ISSN: 1110-2675. Note: In English with an Arabic summary.
Abstract: The study was conducted to determine the chemical composition of 350 camel colostrum and milk samples in United Arab Emirates. Results revealed that the pH, density, fat, protein, lactose, total solids, non fat total solids, ash and moisture of the camel colostrum were 6.19, 1.041 g/ml, 3.1%, 4.95%, 4.4%, 12.88%, 10.55%, 1.11%, and 87%, respectively. The pH, acidity, density, fat, protein, lactose, total solids, non-fat total solids, ash, and moisture were 6.6, 0.133%, 1.028 g/ml, 3.2%, 2.4%, 4.6%, 11%, 7.88%, 0.88%, and 88.9%, respectively. The mineral contents of camel colostrum were calcium, magnesium, sodium, potassium, iron, copper and inorganic phosphate at 103, 15.4, 14.0, 128, 0.25, 0.17 and 43.4 mg/100 mg, respectively. The calcium, magnesium, sodium, potassium, iron, copper, manganese, zinc and phosphorus of camel milk were 74.67, 3.4, 42.36, 136.64,

0.18, 0.04, 0.02, 0.3 and 38.4 mg/100 mg, respectively.
Descriptors: dromedary camels, camel milk, milk composition, milk fat, milk protein, milk quality, chemical composition, colostrum, density, ash, calcium, copper, iron, zinc, lactose, magnesium, moisture content, pH, phosphorus, potassium, sodium, solids not fat, total solids, butterfat, hydrogen ion concentration, milk constituents, milk sugar, potential of hydrogen, SNF, Trucial States, United Arab Emirates.

Rouissi, H; Rekik, B; Gara, AB. **Etude des fermentations dans le rumen des dromadaires "Maghrebi" recevant un fourrage riche en fibres.[A study of fermentation in the rumen of one-humped camel "Maghrebi" fed high fibre roughages.]** *Livestock Research for Rural Development.* 2008; 20(8): 127. ISSN: 0121-3784. Note: In French with an English summary.
Abstract: The rumen fermentation of roughages rich in fibre was studied in one-humped camels. Four one-year-old one-humped camels of the Maghrebi breed were used. The mean liveweight of the animals at the beginning of the study was 220+or-4 kg. All camels were fed vetch-oat hay ad libitum twice a day at 9 and 16 h, and had permanent cannulas in the rumen throughout the experimental period. Rumen content was taken before the morning meal (0 h) and 2, 5 and 8 h thereafter to determine the volatile fatty acids (VFA) and ammoniacal nitrogen concentrations. Ciliate protozoal counts were determined 2 h after the morning meal. In sacco digestibility was measured by nylon bags kept for 3 and 5 days in the rumen. Results showed that the dry matter intake was low, the roughage was well digested and concentrations of total VFA were high (mainly butyric acid) compared to those of ammoniacal nitrogen which were relatively low. The total protozoal count was low. *Epidinium* and *Eudiplodinium* type B protozoa were observed along with *Butchlia*, a protozoa specific for camelids. Although the production of total gas and methane (CH< sub>4</ sub>) was low, the stoichiometry of fermentation was normal (Hydrogen balance was H< sub>2</ sub>=85%). The Maghrebi one-humped camel can utilize low quality roughages due to their digestive particularities.
Descriptors: dromedary camels, Maghrebi breed, feed, digestibility, dry matter fiber, roughage, feed intake, nitrogen, rumen fermentation, rumen protozoa, volatile fatty acids.

Sena, D Suchitra; Mal, Gorakh. **Studies on immunoglobulin and protein profile in pregnant camels**. *Indian Veterinary Journal.* 2008; 85(6): 113-114. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Descriptors: pregnant camels, immunoglobulin, protein profile, blood testing, India.

Sena, DS; Gorakh Mal. **Studies on immunoglobulin and protein profile in pregnant camels.** *Indian Veterinary Journal.* 2008; 85(6): 683-684. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Twenty-two pregnant dromedary camels in their last trimester of pregnancy were used in the study. Blood samples were collected 3 months (Group I), 2 months (Group II) and one month (Group III) prior to parturition and were analysed for immunoglobulins and total serum protein using zinc sulfate turbidity test and commercial kits, respectively. Results

showed that immunoglobulin levels were decreased towards the end of pregnancy, while total protein, albumin, globulin and A:G ratio were increased towards the end of pregnancy. The results of this study can serve as reference values for pregnant dromedary camels.
Descriptors: dromedary camels, pregnant females, gestation, blood picture, blood protein profile, globulins, immunoglobulins, normal values, serum albumin, gamma globulins, immune globulins, plasma protein, serum protein, India.

Shah, MG; Reissmann; Qureshi, S; Schwartz, J. **Evaluation of six camel breeds for heterozygocity through restriction fragment length polymorphism.** *Pakistan Veterinary Journal.* 2008; 28(1): 13-16. ISSN: 0253-8318
Abstract: In the camel tyrosinase gene, a restriction site provoked by the T variant was used in a special restriction fragment length polymorphism analysis (PCR-RFLP) for genotyping of animals from six different Pakistani camel breeds (Marecha, Dhatti, Larri, Kohi, Campbelpuri and Sakrai). For this purpose, four new primer pairs were designed for sequencing the coding region of exon 1 of the tyrosinase gene. PCR reactions were carried out in a total volume of 25 micro L using 100 ng genomic DNA to amplify a 474 bp fragment at 56 degrees C. A SNP (T/C) at 200 bps was found and exploited with a Dde I restriction enzyme that resulted in three different genotypes i.e. TT, TC and CC in each studied camel breed. Significant differences in the genotype frequency between the breeds were recorded. The Sakrai breed showed a distinctly higher frequency of heterozygous animals compared to Marecha, Dhatti, Larri and Kohi breeds. Our new designed primers could be used for genotype screening of other camel breeds. However, for understanding the contribution of tyrosinase gene and its antagonist i.e. agouti in the coat colour production, complete sequence of the gene is imperative.
Descriptors: camels; breed differences, breeds: Marecha, Dhatti, Larri, Kohi, Campbelpuri, Sakrai; coat color; enzymes; genes; heterozygosity; nucleotide sequences; PCR; RFLP; restriction fragment length polymorphism; Pakistan.

Shuiep, ES; El Zubeir, IEM; El Owni, OAO; Musa, HH. **Influence of season and management on composition of raw camel (*Camelus dromedarius*) milk in Khartoum State, Sudan.** *Tropical and Subtropical Agroecosystems*. 2008; 8(1): 101-106. ISSN: 1870-0462. Note: In English with a Spanish summary.
URL: http://www.uady.mx/~veterina/publicaciones/journal/2008-1/151-camel-SN.pdf
Abstract: The influence of seasons (winter and summer) on chemical composition of raw camel milk within two management systems in two different locations around Khartoum State, Sudan was investigated. Camel milk samples (n=112) were collected from Eastern Nile (semi-intensive system) and Western Omdurman (traditional system) using the same procedure for milk sampling. The two locations were approximately of 100 Km distance apart. Titratable acidity and major components of milk were determined. Total solids, lactose and titratable acidity were higher in Eastern Nile samples (P<=0.05), while fat was higher in Western Omdurman (P<=0.01). Non-significant differences were obtained between locations in ash and protein content. Summer samples revealed significantly higher protein content and titratable acidity in Eastern Nile, whereas in winter all components were higher than those examined in summer in both locations. The high water content in summer samples

negatively affected camel milk components compared to winter samples. The influence of season was higher than that reported for management. Feeding of high energy diets and protein concentrates has effect of negative value on fat content and positive value on protein content of camel milk, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camel milk, chemical composition of raw milk, milk quality, lactose, milk fat, milk protein, water content, protein content, total solids, seasonal variations, farm management, Sudan.

Sumant Vyas; Raghvendra Singh; Purohit, GN; Pareek, PK; Sahani, MS. **Ultrasound evaluation of ovarian response to photoperiodic control measures in *Camelus dromedarius*.** *Veterinarski Arhiv.* 2008; 78(1): 39-48. ISSN: 0372-5480. Note: In English with a Croatian summary.
URL: http://www.vef.hr/vetarhiv
Abstract: This study was conducted to determine effect of mask on eyes as a photoperiodic control measure for folliculogenesis in female camels using ultrasound scanner, and analyse the blood progesterone in monitoring the ovarian changes in camels. 14 female camels, 7-11 years old, were used in the study. Seven camels were subjected to the effect of a mask over the eyes (for six hours daily) as a photoperiodic control measure on ovarian activity, while the remaining seven served as the controls. The ovaries were examined by ultrasound at weekly intervals for seven weeks during the non-breeding season. Camels were mated with virile stud when a follicle (>=0.9 cm diameter, ovulating size) was visible on either ovaries. Ovaries were monitored for ovulation up to 48 h post-mating by ultrasound at 12 h intervals and at 20, 30 and 40 days post-mating to ensure pregnancy. A commercial RIA kit was used to measure serum progesterone on blood samples obtained at days 0, 7, 15, 30 and 45 after mating. Results revealed that there were no follicles observed in camels before treatment and in treated (masked) or untreated camels during the first week of treatment. At week three, all camels in the treatment group had measurable small follicles (0.5-0.89 cm, 6/7) or had follicles of ovulating size (>=0.9 cm, 1/7). Follicles of ovulating size were observed in 28.6, 14.3, 14.3 and 14.3% camels after weeks 4, 5, 6 and 7 of treatment. 50% (3/6) of the camels became pregnant. The serum plasma progesterone level increased after ovulation and remained higher than 1.0 ng/ml in pregnant camels. In the control group, one camel had a follicle (0.6 cm diameter) at week 5 after treatment, but it did not reach ovulating size. It is suggested that protecting the eyes from the sunlight one or two months before the breeding season stimulates follicular growth in camels and pregnancy can occur in these camels when mated. Reproduced with permission of CAB.
Descriptors: dromedary camels, pregnancy, gestation, photoperiodism, eyes, breeding season, ovaries, oogenesis, ovarian follicles, ovulation, progesterone, ultrasound.

Tajik, P; Lamsoo, MRHN. **Assessment of epididymal sperm obtained from dromedary camel.** *Iranian Journal of Veterinary Research*. 2008; 9(1): 46-50. ISSN: 1728-1997. Note: In English with a Persian summary.
URL: http://www.shirazu.ac.ir/en/index.php?page_id=60
Abstract: Testicles were isolated from dromedary camels from a local slaughterhouse during the breeding and non-breeding seasons. Sperms were recovered from different parts of the epididymis (caput, corpus and cauda) and were stained, dried and examined under a light microscope for the proportion of live sperms and sperms with cytoplasmic droplets. The

proportions of live sperm cells were 76.8, 86.9 and 88.8% for caput, corpus and cauda epididymis, respectively. In the left testicle, these values were 85.3, 83.1 and 88.4 for caput, corpus and cauda epididymis, respectively. No significant difference was observed in the live sperm cells obtained from the right and left testicles. The proportions of live sperm cells were 83, 90 and 86% during the breeding and 80, 82 and 90.5% during the non-breeding seasons for caput, corpus and cauda epididymis, respectively. The proportions of live sperms with protoplasmic droplets were 66, 70 and 74% during the breeding and 73, 70 and 82% during the non-breeding season for caput, corpus and cauda epididymis, respectively. The proportions of live sperms with protoplasmic droplets were not significantly different between the right and left testicles or among the different parts of the epididymis. It is concluded that sperm cells can be obtained from any part of the epididymis. Reproduced with permission of CAB.

Descriptors: dromedary camels, sperm, breeding season, epididymis, spermatozoa, testes, testicles, post slaughter tissues.

Yang FuLin; Wang HuCheng; Guo XuSheng; Long RuiJun. **Review of purine derivatives in urine to estimate rumen microbial protein production.** *Acta Prataculturae Sinica.* 2008; 17(1): 121-129. ISSN: 1004-5759. Note: In Chinese with an English summary. A review article.

Abstract: Urinary excretion of purine derivatives (PD), like allantoin, uric acid, xanthine and hypoxanthine, have been studied in ruminants with the objective of using the excretion of these purine metabolites as a parameter to estimate rumen microbial protein. The PD in the urine is a good marker for estimating rumen microbial synthesis. This paper covers endogenous excretion in ruminants, modelling the response of PD excretion to purine absorption, calculation of microbial nitrogen supply from PD excretion using all-urine and spot urine measurement, and the current understanding of PD excretion in different animal species, including sheep, cattle, goats, buffaloes, yaks, camels and llamas.

Descriptors: buffalo, dromedary camels, goats, llamas, sheep, yaks, ruminants, allantoin, excretion, hypoxanthine, nitrogen, protein biosynthesis, purine bases, purines, rumen microorganisms, uric acid, urine, xanthine.

Zeidan, AEB; El Baz, MM; Ahmadi, EA; El Aziz, NAA; El Salaam, AMA. **Use of hypoosmotic swelling test for evaluating camel spermatozoal membrane integrity in relation to different solutions.** *Veterinary Medical Journal Giza*. 2008; 56(1): 109-122. ISSN: 1110-1423. Note: In Enlish with an Arabic summary.

Abstract: Five male camels at 5 to 10 years of age and 400-600 kg body weight, were used in the present study. Semen was collected, evaluated, pooled and extended with seven different hypoosmotic solutions (glucose-yolk-citrate: GYC, fructose-yolk-citrate: FYC, lactose-yolk-citrate: LYC, sucrose-yolk-citrate: SYC, tris-yolk-fructose: TYF, skim-cow-milk: SCM and skim camel-milk: SLM) at a level of 100 mOsmol/L and then incubated at 37 degrees C for up to 60 minutes. After each incubation time (0, 5, 15, 30 and 60 minutes), the percentages of sperm motility, spermatozoa with intact acrosome, spermatozoa with coiled tails and swollen spermatozoa, were estimated. The results showed that, the extended camel semen with FYC, SYC, TYF and SCM solutions at a level of 100 mOsmol/L, during an incubation of 37 degrees C for up to 60 minutes increased significantly ($P<0.01$) the percentage of sperm motility, spermatozoa with intact acrosome and swollen spermatozoa as compared

to GYC, LYC and SLM solutions, however, the percentage of spermatozoa with coiled tails decreased significantly (P<0.01) in the extended camel semen with SYC and TYF solutions as compared to GYC, FYC, LYC, SCM and SLM solutions. The advancement of incubation time at 37 degrees C for up to 60 minutes with the all different solutions (GYC, FYC, SYC, LYC, TYF, SCM and SLM) at 100 mOsmol/L decreased significantly (P<0.01) the percentages of sperm motility and percentage of spermatozoa with intact acrosome, while was increased significantly (P<0.01) the percentage of swollen spermatozoa and spermatozoa with coiled tails. The maximum reactivity of the extended camel spermatozoa with the all different solutions to hypoosmotic swelling-test (HOS-test) was reached significantly (P<0.01) at 30 minutes of incubation at 37 degrees C.
Descriptors: dromedarycamels, males, reproduction disorders, male infertility, semen, spermatozoa, motility, diagnostic methods, hypoosmotic swelling test, diagnosis, diagnostic techniques, infertility, methodology.

Zia Ur Rahman, D; Bukhari, SA; Ahmad, N; Akhtar, N; Ijaz, A; Yousaf, MS; Haq, IU. **Dynamics of follicular fluid in one-humped camel (*Camelus dromedarius*).** *Reproduction in Domestic Animals.* 2008; 43(6): 664-671. ISSN: 0936-6768
NAL call no: SF105.A1Z8
Descriptors: dromedary camels, healthy adult females, differences between small and large ovarian follicular fluid, serum sampling, biochemistry, hormones, electrolytes, amino acid profiles, glucose, cholesterol, triglycerides, high-density lipoproteins, urea, total proteins, albumin, globulin, fibrinogen, alanine aminotransferase, aspartate aminotransferase, triiodothyronine, estradiol, 17 beta, progesterone, phosphorus, potassium, leucine, arginine.

Zidan, Mohamed; Pabst, Reinhard. **Unique microanatomy of ileal Peyer's patches of the one humped camel (*Camelus dromedarius*) is not age-dependent.** *Anatomical Record.* 2008; 291(8): 1023-1028. ISSN: 1932-8486 (print); 1932-8494 (electronic)
URL: http://www.wiley.com/bw/aims.asp?ref=1932-8486&site=1
Descriptors: dromedary camels, various ages, age comparison, Peyer's patches (PP), localization of ileal Peyer's patches, histology, ultra structure, lymphoid follicles, clear germinal center, endothelial venules in interfollicular region, dark rose-colored isolated structure, cup shaped, three irregular row arrangement.

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Abdoon, ASS; Kandil, OM; Berisha, B; Kliem, H; Schams, D. **Morphology of dromedary camel oocytes and their ability to spontaneous and chemical parthenogenetic activation.** *Reproduction in Domestic Animals.* 2007 Feb; 42(1): 88-93. ISSN: 0936-6768
DOI: http://dx.doi.org/10.1111/j.1439-0531.2006.00737.x
NAL call no: SF105.A1Z8
Abstract: The present work was conducted to examine (1) the morphology of dromedary cumulus-oocytes complexes (COCs), (2) to study the incidence of spontaneous development of oocytes in vivo and (3) to assess the ability of in vitro matured dromedary oocytes to chemical parthenogenetic activation compared with in vitro fertilized (IVF) oocytes. COCs were recovered from dromedary ovaries classified according to their morphology into six

categories. Oocyte diameter was measured using eye piece micrometer. For chemical activation, COCs with at least three layers of cumulus-cells were in vitro matured (IVM) in TCM 199 + 10 (So(Bg/ml FSH + 10 IU hCG/ml + 10% FCS + 50 (So(Bg/ml gentamycin. COCs were incubated for 40 h at 38.5degrees C under 5% CO subscript 2(B in humidified air. After IVM, matured oocytes with first polar body (first Pb) were divided into two groups. Group 1: activated in 7% ethanol (E) for 5 min followed by culture in 2 mM 6-dimethylaminopurin (6-DMAP, E D, subgroup 1) or 10 (So(Bg/ml cycloheximide (CHX, E CHX, subgroup 2) for 3.5 h at 38.5degrees C under 5% CO subscript 2(B. In group 2, oocytes were activated using 50 (So(BM Ca A23187 (Ca A) for 5 min followed by culture in 2 mM 6-DMAP (Ca D, subgroup 3) or 10 (So(Bg/ml CHX(Ca CHX, subgroup 4) for 3.5 h at 38.5degrees C under 5% CO subscript 2(B. For control group, IVM oocytes were fertilized using frozen-thawed camel spermatozoa separated by swim-up method then suspended in Fert-TALP medium supplemented with 6 mg/ml BSA (FAF) + 10 (So(Bg/ml heparin. In all groups, oocytes were in vitro cultured in SOFaa medium + 5% FCS and 5 (So(Bg/ml insulin + 50 (So(Bg/ml gentamycin. Cleavage rate and embryo development were checked on Days 2, 5 and 8. An average of 11.3 +/- 0.3 COCs were recovered/dromedary ovary. Categories 1 and 2 represented 33.1% and 34.8%, respectively, and were significantly higher ($p < 0.01$) than the other categories (19.1, 9.2 and 2.6% for categories 3-5, respectively). Category 6 (embryo-like structures) represented 1.2% of the recovered oocytes, staining of these embryo-like structures with orcien dye indicated the presence of divided cells with condensed nuclei. Dromedary oocytes averaged 166.2 +/- 2.6 (So(Bm in diameter with black cytoplasm. Chemical activation of IVM dromedary oocyte with first Pb in 7% ethanol or 50 (So(BM Ca A followed by culture in 2 mM 6-DMAP showed significantly higher ($p < 0.01$) cleavage and developmental rates to the morula stage than oocytes activated using 7% ethanol or 50 (So(BM Ca A followed by 10 (So(Bg/ml CHX or in vitro fertilized control group. Higher ($p < 0.01$) proportion of oocytes sequentially cultured in 10 (So(Bg/ml CHX or that in vitro fertilized were arrested at the 2-4-cell stage compared with that cultured in 6-DMAP.
Descriptors: dromedary camels, oocytes,cumulus oocytes complexes, morphology, incidence of spontaneous development in vivo, chemical parthenogenetic activation, chemical exposure process.

Abdoun, KA; Amin, ASA; Abdelatif, AM. **Milk composition of dromedary camels (*Camelus dromedarius*): nutritional effects and correlation to corresponding blood parameters.** *Pakistan Journal of Biological Sciences.* 2007; 10(16): 2724-2727. ISSN:
URL: http://www.ansinet.org/pjbs
Abstract: This study has been conducted in order to study the possible correlations between the nutritional value of plants selected by camels during the dry and green season and the corresponding blood and milk composition of the dromedary camels. The study has been conducted on 50 indigenous Arabian camels of different age and kept under natural range in Southern Darfur. The dromedary camels selected plants with significantly ($p<0.05$) higher crude protein content during the dry season and kept the serum albumin concentration and milk protein content at the same levels as those observed during the green season. However, the significantly ($p<0.05$) higher lipogenic content (ether extract + crude fibre) of the plant selected during the dry season resulted in significantly ($p<0.05$) higher serum triacylglycerides concentration and significantly ($p<0.05$) higher milk fat content compared to that of the

green season. Although, the camels selected plants with significantly ($p<0.05$) higher nitrogen free extract content during the dry season, the plasma glucose level and the milk lactose content were significantly ($p<0.05$) reduced compared to that of the green season. The significantly ($p<0.05$) lower ach content of the plants selected during the dry season resulted in significantly lower serum calcium + phosphorus concentration, but did not reflect on the ash content of the milk. The results indicate that despite camels selectivity and unique adaptation to arid conditions, the milk lactose-and fat content were affected by the nutritional scarcity during the dry season. Therefore, it could be beneficial to provide energy-rich feed supplemented with calcium and phosphorus to camels kept under dry tropical conditions.
Descriptors: dromedary camels, camel milk, crude protein, feed supplements, hematology, lactose, lipids, milk composition, milk fat, butterfat, milk protein, nutritive value, phosphorus, calcium, plant composition, triacylglycerols, tropics, chemical constituents of plants, hematology, lipins, milk constituents, milk sugar, nutritional value, quality, for nutrition, triglycerides, tropical countries, tropical zones.

Al Azraqi, AA. **Relationship of serum leptin concentration to fat deposition in slaughtered young camels.** *Journal of Animal and Veterinary Advances*. 2007; 6(1): 16-19. ISSN: 1680-5593
Abstract: This study was conducted to determine the time of onset of fat deposition in young camels (n=166) and its relationship to body weight, age and serum leptin concentration. The body weight, backfat thickness and serum leptin concentration were measured in the young camels. The serum concentration of leptin increased linearly with the body fat and age and highly correlated with backfat thickness, suggesting that serum leptin content was a good indicator of body fatness in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels,age differences, backfat, body fat, body weight, fat thickness, leptin.

Al Busadah, KA. **Some biochemical and haematological indices in different breeds of camels in Saudi Arabia**. *Scientific Journal of King Faisal University Basic and Applied Sciences*. 2007; 8(1): 131-142. ISSN: 1658-0311. Note: In English with an Arabic summary.
Abstract: Normal haematological and biochemical parameters have been determined in 3 breeds of Arabian camel (*Camelus dromedaries*) Both males and females were included in the study. Statistical analysis showed non-significant breed or sex effect. Compared to other farm animals haematological indices in the camel characteristically showed that lymphocytes were the predominant leucocytes. Packed cell volume was lower and mean corpuscular haemoglobin concentrations were in excess. Albumin/globulin ratio exceeded 1 and gamma globulin was the predominant globulin. Reproduced with permission of CAB.
Descriptors: dromedary camels, hematology, hemoglobin, hematocrit, albumins, breed differences, globulins, leucocytes, lymphocytes, white blood cells, Saudi Arabia.

Al Majali, AM; Ismail, ZB; Al Hami, Y; Nour, AY. **Lactoferrin concentration in milk from camels (*Camelus dromedarius*) with and without subclinical mastitis.** *International Journal of Applied Research in Veterinary Medicine.* 2007; 5(3): 120-124. ISSN: 1542-2666
URL: http://www.jarvm.com
Abstract: The purposes of this study were to investigate the levels of lactoferrin in 180 normal and 132 mastitic camel milk samples and to elucidate the effect of age, lactation

stage, presence of pathogens, and somatic cell counts (SCC) on the concentration of lactoferrin in camel milk using radial immunodiffusion test. The mean log concentration of lactoferrin from mastitic camels (3.8+or-0.67) was significantly higher than that in normal camels (2.65+or-0.88). The mean log concentrations of lactoferrin in 3- and 4-year-old lactating camels were significantly higher than that in older camels. A correlation was observed between the levels of lactoferrin in normal and mastitic camel milk and the SCC score. The log lactoferrin concentrations in subclinical mastitic camel milk infected with Staphylococcus aureus and coagulase-negative staphylococci isolates were significantly higher than those for other bacterial isolates. No differences in the concentration of lactoferrin were observed in reference to the stage of lactation. These data could help in understanding the mechanisms of udder resistance to infections. In addition, levels of lactoferrin in milk could be used as a diagnostic tool in cases of subclinical mastitis.

Descriptors: dromedary camels, lactation, lactation stage, age differences, disease markers, lactoferrin, mastitis, milk composition, milk quality, somatic cell count, subclinical mastitis, coagulase negative staphylococci, *Staphylococcus aureus*.

Al Qarawi, AA; El Mougy, SA. **The existence of extrapineal locations for melatonin synthesis in the one-humped camel (*Camelus dromedarius*).** *Biological Rhythm Research*. 2007; 38(1): 55-63. ISSN: 0929-1016

DOI: http://dx.doi.org/10.1080/09291010600832289

Abstract: We studied the sites of melatonin synthesis which was measured using the radioimmunoassay technique in the eye retina, skin, Harderian gland, liver tissue and jejunal mucosa in the immature and mature (non-rutting and rutting) *Camelus dromedarius*. For the first time, melatonin hormone was found in extrapineal sources in camel. These sites included the retina, skin, Harderian gland, liver and jejunal mucosa. The levels of melatonin in these sites reached 80.7, 33.5, 84.6, 548.9 and 2024.1 pg/mg, respectively, in the immature camel. In the mature non-rutting camel, during the non-mating season, the level of melatonin was estimated at 73.7, 41.1, 86.3, 1942.6 and 44112.0 pg/mg, respectively, giving a generally high level. In the mating rutting camel during the winter season, the melatonin level exhibited a level of 77.2, 39.5, 82.0, 930.9 and 14644.0 pg/mg, respectively, with an indication of a general decrease with the exception of the retinal melatonin when compared to the non-rutting camel. It should be noted that the finding of the melatonin hormone in the skin has never been recorded before, and has never been estimated before in other animals. The results in the present investigation also revealed that the wild plants upon which camels usually feed contain a significant amount of melatonin (838.2 pg/g in *Chloris gayana* and 226.6 pg/g in *Anabasis setifera*). This could be one of the factors causing an increase in the level of melatonin in the blood and consequently influencing testicular regression during the non-rutting season.

Descriptors: dromedary camels, non-rutting camels, rutting camels, melatonin hormone synthesis, extrapineal sources found, radioimmunoassay techniques, eye retina, skin, Harderian gland, liver tissue, jejunal mucosa, breeding season, plant composition, reproduction, seasonal variation; seasonality, tissue distribution, *Anabasis setifera*, *Chloris gayana*, endocrine secretion, immunoradiometric assay, radioimmunosorbent assay, seasonal fluctuations.

Al Sobayil, KA; Khalil, MH; Al Saef, AM; Mohamed, KM; Salal, SA. **Genetic evaluation for growth of calves at early stage in Saudi camels.** *Journal of Camel Practice and Research.* 2007; 14(2): 175-180. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A 383 progeny records for Saudi camels were genetically analysed and evaluated for growth performance of body weights at birth and bimonthly, thereafter up to 12 months of age along with gains in weight at 2-month intervals. Data were analysed using DFREML procedure to estimate heritabilities, maternal common environment and random error. Breeding values for growth traits of calves in this population were predicted using an animal model. Phenotypic variations for most growth traits in Saudi camels were moderate or slightly high; ranging from 7.0 to 35.2%. Heritabilities were moderate or slightly high and ranging from 0.24 to 0.40. Ratios of maternal common environment were mostly moderate and ranging from 0.10 to 0.30. The ranges in breeding values for growth traits of animals were 25.3, 39.6, 61.0, 70.1, 83.7, 104.3, 109.6, 111.0, 102.1, 96.7, 81.0, 115.1, and 96.7 kg for body weight at 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 months of age, respectively. While, the ranges in estimates of breeding values for daily gain in weights were 0.270, 0.348, 0.371, 0.471, 0.491, 0.542, and 0.638 kg at intervals of 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, and 0-12 months of age, respectively. Accuracies of breeding values recorded for growth traits were moderate; ranging from 0.46 to 0.75. For the list of all camels, the additive selection responses per generation (SR< sub>A</ sub>) predicted were moderate or high and nearly similar at different stages of growth; ranging from 5.7 to 12.2% relative to the actual mean of the trait. Reproduced with permission of CAB.

Descriptors: dromedary camels, young animals, camel breeding, artificial selection, birth weight, breeding value, genetic analysis, genetic variation, growth, heritability, liveweight, phenotypes, genetic variability, genotypic variability, genotypic variation, heritable characters, Saudi Arabia.

Al Sultan, SI; Mohammed, AM. **The effects of the number of lactations on the chemical composition of camel milk.** *Journal of Camel Practice and Research*. 2007; 14(1): 61-63. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The effect of the number of lactations on the chemical composition of camel milk was studied in 20 she-camels. They were divided into Groups A, B, C and D, each group consisting of 5 she-camels of similar age. Group A was in first, B in second, C in third and D was in the fourth lactation period. The parameter investigated included the pH, specific gravity (S.G.), total solids (T.S.), water content, protein, fat, lactose and minerals (Ca and P). It was shown that the number of lactations had no effect on pH, S.G., T.S. water content and protein, fat, lactose and minerals (Ca and P) of camel milk and the differences were not significant among the 4 groups for these parameters. Reprodcued with permission of CAB.

Descriptors: dromedary camels, camel milk production, camel milk, number of lactations, lactose, milk, sugar, milk composition; milk fat percentage, milk protein percentage, milk quality, minerals, calcium, pH, phosphorus, specific gravity, total solids, water content.

Al Sultan, SI. **Effect of feeding urea-treated wheat straw on body weight gain and biochemical metabolites of young camels.** *Journal of Food, Agriculture and Environment.* 2007; 5(2): 202-203. ISSN: 1459-0255

Abstract: Ten young camels divided into two groups fed daily with wheat straw and urea-treated wheat straw were used in the study to determine its effect on liveweight gain and blood chemistry. Spraying of urea solution (0.1 g/ml) in water to wheat straw at a concentration of 40 g/kg resulted in two-fold increase in protein content of straw. Results showed that feeding of urea-treated straw to camels significantly increased liveweight gain when compared with camels fed on straw only. Urea-treated straws had no significant effect on the enzyme activities and blood chemistry of treated animals, except on the serum ammonia and urea level. Lack of adverse effect of feeding urea on liver, heart and muscle-specific enzymes suggested that feeding urea at this concentration could be tolerated. Reproduced with permission of CAB.

Descriptors: dromedary camels, young camels, diets, feed treatment, wheat straw, urea additive, protein content increased, effects on live weight gain, blood chemistry, ammonia, enzyme activity

Ali, M Al Haj; Nyberg, Fred; Chandranath, SI; Dhanasekaran, S; Tariq, Saeed; Petrolanu, G; Hasan, MY; Adeghate, Ernest A.; Adem, A. **Distribution of neuroendocrine cells in the small and large intestines of the one-humped camel (*Camelus dromedarius*).** *Neuropeptides.* 2007; 41(5): 293-299. ISSN: 0143-4179

Abstract: The distribution and relative frequency of neuroendocrine cells in the small and large intestines of one-humped camel were studied using antisera against 5-hydroxytryptamine (5-HT), cholecystokinin (CCK-8), somatostatin (SOM), peptide tyrosine tyrosine (PYY), gastric inhibitory polypeptide (GIP), neuronal nitric oxide synthase (nNOS), gastrin releasing peptide (GRP), substance P (SP), and neurokinin A (NKA). Among these cell types, CCK-8 immunoreactive (IR) cells were uniformly distributed in the mucosa, while others showed varied distribution in the villi or crypts of the small intestine. Immunoreactive cells like 5HT, CCK-8, and SOM showed peak density in the villi and crypts of the small intestine and in the colonic glands of the large intestine, while cells containing SP were discerned predominately in the crypts. 5-HT, CCK-8 and SOM cells were mainly flask-shaped and of the open-variety, while PYY and SP immunoreactive cells were mainly rounded or basket-shaped and of the closed variety. Basically the distribution pattern of the endocrine cells in the duodenum, jejunum and colon of the one-humped camel is similar to that of other mammals. Finally, the distribution of these bioactive agents may give clues as to how these agents aid in the function of the intestinal tract of this desert animal.

Descriptors: dromedary camels, small intestine, large intestine, neuroendocrine cells, 5-hydroxytryptamine (5-HT), cholecystokinin (CCK-8), somatostatin (SOM), peptide tyrosine tyrosine (PYY), gastric inhibitory polypeptide (GIP), neuronal nitric oxide synthase (nNOS), gastrin releasing peptide (GRP), substance P (SP), and neurokinin.

Ali, Shujait; Ahmad, Nazir; Akhtar, Nafees; Zia ur Rahman; Sarwar, M. **Effect of season and age on the ovarian size and activity of one-humped camel (*Camelus dromedarius*).** *Asian Australasian Journal of Animal Sciences.* 2007; 20(9): 1361-1366. ISSN: 1011-2367

URL: http://www.ajas.info
Descriptors: dromedary camels, normal 3-5 year olds, females, post slaughter tissue sampling, ovarian size, comparison between low and peak breeding season, jugular blood before slaughter, estradiol concentrations, ovary metrics, length, width, thickness, weight, gross observations, numbers of Graafian follicle plus 5 mm diameter, all measurements higher in peak breeding season, Pakistan, Somalia, Ethiopia.

Alloui-Lombarkia, O; Ghennam, EH; Bacha, A; Abededdaim, M. **Caracteristiques physico-chimiques et biochimiques du lait de chamelle et separation de ses proteines par electrophorese sur gel de polyacrylamide.[Physico-chemical and biochemical properties of camel milk and separation of its proteins by polyacrylamide gel electrophoresis.]** In: *14 Emes Recontres Autour des Recherches sur les Ruminants, Paris, les 5 et 6 Decembre 2007.* 2007; 108. Note: In French.
Descriptors: dromedary camels, camel milk, chemical composition, milk composition, milk protein, PAGE, physicochemical properties, separation.

Aminu Deen; Nand Kishore. **Oestradiol hormone profiles of unmated female camels during breeding season.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 103-106.
Abstract: The study was conducted in 4 female camels (*Camelus dromedarius*), which harboured mature follicle in ovaries as revealed by rectogenital palpation of ovaries. Circulating oestradiol profiles were monitored in these cycling females in unmated state for a continuous period of 21 days at an interval of 6 hrs daily round the clock without any interruption. Anti-oestradiol serum procured from Professor Niswender and tritiated oestradiol procured from Amersham Bio-Sciences Limited, U.K. was used for the quantitation of oestradiol. The average daily oestradiol profiles in peripheral plasma varied from 10.3+or-9.9 to 373.5, 48.1+or-7.1 to 241.0+or-60.6, 41.5+or-12.2 to 303.8+or-155.6 and 36.2+or-7.3 to 240.3 pg/ml plasma in different animals. The overall average concentration over 20-21 days in 4 female camels measured 70.0, 75.3, 103.0 and 124.4 pg/ml, respectively. The higher values of 373.5, 390.4, 569.9 and 732.9 pg/ml observed in different animals is also worth reporting. The peripheral concentration varied widely in all the animals and fluctuated regularly. The important observations included slow increase and peaks followed by decline. Usually, the peak levels were maintained for short period but occasionally these persisted for 12-18 hrs also in all of the 4 animals studied These changes were repeated regularly in an unmated female camel. It was concluded that basal levels of this hormone in camel is higher than other livestock species. In unmated female camels, ups and downs in oestradiol concentration maybe due to uninterrupted growth, maturation, regression with recruitment of fresh follicular waves and inter regulating feed back with FSH. Reproduced with permission of CAB.
Descriptors: dromedaries, breeding season, endocrine secretion profile, blood chemistry, breeding season, estradiol levels.

Attallah, AG. **Characters of chymosin gene isolated from different animal sources at molecular level.** *Journal of Applied Sciences Research*. 2007; (September): 904-907. ISSN: 1816-157X
URL: http://www.insinet.net/jasr/2007/904-907.pdf

Abstract: Four different animal tissues as a source for chymosin gene and three set of primers were used in this study. SDS-PAGE Polyacrylamide gel electrophoresis and PCR amplification techniques were used to differentiate between these animal rennet. After electrophoresis, the molecular weight of the enzyme was 40 kDa on SDS-PAGE for Buffalo and Cow but appears 43 kDa and 30 kDa for Camel and Pig chymosin, respectively. Two prominent proteins were found in cow and buffalo rennet, while only one protein was observed in camel and pig. These patterns provided a basis for distinguishing animal rennet and the other enzymes as well as a means of identifying each type of enzyme by the characteristic pattern were shown. Also PCR product were identified. Reproduced with permission of CAB.
Descriptors: buffalo, cattle, dromedary camels, pigs, animal tissue testing, amino acid sequences, amplification, milk clotting enzyme, chymosin, rennet,rennin, genes, molecular genetics, PCR, SDS-PAGE, sodium dodecyl sulfate PAGE, biochemical genetics, protein sequences.

Bakhiet, AO; Mohammed, AA; Siham, ESM; El Badwi, MAS. **Some trace-elements profile in the liver of camels, cattle, sheep and goats.** *International Journal of Tropical Medicine.* 2007; 2(1): 1-2. ISSN: 1816-3319
Abstract: Hepatic concentrations of Copper (Cu), Zinc (Zn), Iron (Fe) and Cobalt (Co) of dromedary camels were determined and compared with those of cattle, sheep and goats. Hepatic Cu concentration was significantly higher in camels than cattle, sheep and goats. Liver concentrations of Zn and Co which obtained from cattle, sheep and goats were lower than the range recorded for ruminants. In camels, hepatic Zn and Co values were lower in concentration than those other ruminants. High Fe content of camels' liver was recorded.
Descriptors: dromedary camels, cattle, goats, sheep, liver concentrations, trace elements, microelements, zinc, cobalt, copper, iron, comparison study.

Barri, MES; Al Sultan, SI. **Studies on selenium and vitamin E status of young Megaheem dromedary camels at Al-Ahsa Province.** *Journal of Camel Practice and Research.* 2007; 14(1): 51-53. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Fifty blood samples collected at slaughter from young Megaheem dromedary camels (3-4-months-old) were analysed for selenium, vitamin E, aspartate aminotransferase (AST) and creatine kinase (CK). 30% of the samples analysed in this study also showed levels of selenium above 100 mg/ml. 30% of the samples showed values higher than 50 mg/ml, while, 34 and 6% of the samples showed levels below 50 and 10 mg/ml, respectively. As for vitamin E, 50% of the samples analysed were above 1 mg/ml, where 28 and 22% of the samples were below 1 and 0.5 mg/ml, respectively. The mean values for AST and CK in the blood were 21.6+or-0.03 and 76.8+or-0.3 IU/litre, respectively. Reproduced with permission of CAB.
Descriptors: Megaheem dromedary camels, young animals, aspartate aminotransferase, blood chemistry, creatine kinase, selenium, vitamin E, creatine phosphokinase; GOT.

Deen, A; Vyas, S; Sahani, MS; Saharan, P; Sevta, I; Chabra, S. **Estradiol-17 beta and progesterone profiles of female camels at different reproductive stages.** *Israel Journal of Veterinary Medicine.* 2007; 62(1): 20-27. ISSN: 0334-9152

URL: http://www.isrvma.org/TextPage.aspx?ID=25

Abstract: The study was conducted on 56 female camels for E< sub>2</ sub> and P< sub>4</ sub> profiles at different reproductive stages, viz. 35 bred females (Group A) monitored after breeding once daily for 0-30 days were divided into 2 groups of pregnant (n=13) and nonpregnant (n=22) based on P< sub>4</ sub> profiles, another pregnant group (Group B) (n=8) was monitored at weekly intervals from 23rd weeks to the end of gestation; periparturient camels (Group C) were monitored at 6 h intervals, while nonpregnant females (n=7) (Group D) with growing and mature follicles were monitored for E< sub>2</ sub> profiles only and the final group (Group E) (n=6) of nonpregnant females was monitored for E< sub>2</ sub> profiles before and after mating. The average P< sub>4</ sub> concentrations in pregnant and nonpregnant females of group A were similar from days 0-10 after mating. They declined from day 11 onward in nonpregnant females, but continued to increase in pregnant animals (P<0.01). The average daily E< sub>2</ sub> profiles were found to be low or basal in both non-pregnant (1.32 to 8.74 pg/ml) and pregnant females (0.69 to 8.24 pg/ml). The average concentration of P< sub>4</ sub> in group B was relatively higher (5.87 to 12.07 ng/ml) between 23rd to 32nd weeks of gestation than at later stages (2.88 to 5.09 ng/ml). The average concentration of P< sub>4</ sub> recorded in periparturient female camels of Group C was around 4.0-4.5 ng/ml at 55-31 hrs prior to parturition and declined slightly to measure 3 ng/ml at parturition. A further decline in P< sub>4</ sub> concentration to 1.6 ng/ml occurred after expulsion of the fetus. The average concentration of E< sub>2</ sub> was low up to 38th weeks of gestation. It started to increase slowly and steadily after the 39th week and measured more than 50, 100, 250, 300 and 375 pg/ml at the 42nd, 45th, 47th, 49th and 52nd weeks of gestation, respectively. It declined in periparturient females to 92.2-243 pg/ml at 1-55 hrs before calving. It further declined sharply to 23.3, 5.6 and 6.6 pg/ml at 5, 11 and 17 hrs after calving. E< sub>2</ sub> profiles of nonpregnant females of group D (n=7) with mature sized ovarian follicles monitored at 30 minute intervals for 2 hrs daily for 15-20 days (for E< sub>2</ sub> profiles only) revealed mostly basal levels with a few intermittent peaks, indicating the pulsatile nature its secretion One group of nonpregnant females, Group E (n=6) with mature follicles monitored for E< sub>2</ sub> profiles only, one day prior to and immediately after mating showed that E< sub>2</ sub> profiles ar these times did not differ. Reproduced with permission of CAB.

Descriptors: dromedary camels, blood chemistry, estradiol, hormone secretion, ovarian follicles, ovaries, parturition, pregnancy, gestation, progesterone, radioimmunoassay, reproduction, endocrine secretion, gestation, immunoradiometric assay, radioimmunosorbent assay.

Desantis, S; Ventriglia, G; Lacalandra, GM; Hammadi, M; Sedik, MM; De Metrio, G. **Distribution of sialoglycoconjugates in the epithelium of the dromedary oviduct** . *Reproduction in Domestic Animals.* 2007; 42(Suppl. 2): 109. ISSN: 0936-6768. Note: "11th Annual Conference of the European Society for Domestic Animal Reproduction, Celle, Germany; September 21 -22, 2007."

NAL call no: SF105.A1Z8

Descriptors: dromedary camels, epithelium, lectin, sialoglycoconjugates, SNA, Forssman pentasaccharide, asialoglycoprotein, DBA, NeuAcForssman, capacitation, cell to cell interaction.

Duehlmeier, R; Sammet, K; Widdel, A; Engelhardt, W von; Wernery, U; Kinne, J; Sallmann, HP. **Distribution patterns of the glucose transporters GLUT4 and GLUT1 in skeletal muscles of rats (*Rattus norvegicus*), pigs (*Sus scrofa*), cows (*Bos taurus*), adult goats, goat kids (*Capra hircus*), and camels (*Camelus dromedarius*).** *Comparative Biochemistry and Physiology A, Molecular and Integrative Physiology.* 2007; 146(2): 274-282. ISSN: 1095-6433

DOI: http://dx.doi.org/10.1016/j.cbpa.2006.10.029

Abstract: Earlier studies demonstrated that forestomach herbivores are less insulin sensitive than monogastric omnivores. The present study was carried out to determine if different distribution patterns of the glucose transporters GLUT1 and GLUT4 may contribute to these different insulin sensitivities. Western blotting was used to measure GLUT1 and GLUT4 protein contents in oxidative (masseter, diaphragm) and glycolytic (longissimus lumborum, semitendinosus) skeletal muscle membranes of monogastric omnivores (rats and pigs), and of forestomach herbivores (cows, adult goats, goat kids, and camels). Muscles were characterized biochemically. Comparing red and white muscles, the isocitrate dehydrogenase (ICDH) activity was 1.5-15-times higher in oxidative muscles of all species, whereas lactate dehydrogenase (LDH) activity was 1.4-4.4-times higher in glycolytic muscles except in adult goats. GLUT4 levels were 1.5-6.3-times higher in oxidative muscles. GLUT1 levels were 2.2-8.3-times higher in glycolytic muscles in forestomach herbivores but not in monogastric animals. We conclude that GLUT1 may be the predominant glucose transporter in glycolytic muscles of ruminating animals. The GLUT1 distribution patterns were identical in adult and pre-ruminant goats, indicating that GLUT1 expression among these muscles is determined genetically. The high blood glucose levels of camels cited in literature may be due to an "NIDDM-like" impaired GLUT4 activity in skeletal muscle. Reproduced with permission of CAB.

Descriptors: cows, cattle, dromedary camels, goats, pigs, rats, *Rattus norvegicus*, age differences, blood sugar, enzyme-activity, enzymes, glucose, glycolysis, insulin, ion transport, isocitrate dehydrogenase, lactate dehydrogenase, protein content, skeletal muscle, species differences, tissue distribution, blood -glucose, dextrose, glucose in blood.

El Hatmi, H; Girardet, JM; Gaillard, JL; Yahyaoui, MH; Attia, H. **Characterisation of whey proteins of camel (*Camelus dromedarius*) milk and colostrum.** *Small Ruminant Research.* 2007 July; 70(2-3): 267-271. ISSN: 0921-4488

NAL call no: SF380.I52

Abstract: Variation in the composition of whey proteins from camel (*Camelus dromedarius*) colostrum and milk was recorded over a 192 h period following parturition. Whey proteins were separated by cation-exchange fast protein liquid chromatography and identified by polyacrylamide gel electrophoresis. The main components of whey proteins in camel milk and colostrum were similar to that in bovine, except for the lack in o-lactoglobulin. Serum albumin was the major whey protein present in camel milk, with an average concentration of 10.8 g/l. Camel colostrum was rich in immunoglobulins G, which consist of IgG1, and the enzyme inhibitory antibodies IgG2 and IgG3. The concentration of these proteins decreased rapidly 48 h post partum. Lactophorin (proteose peptone-component 3) and basic whey protein were detected only within 48 h after parturition, reaching a level of 4.9 and 3.1 g/l at 192 h post partum, respectively. The maximum level of lactoferrin (2.3 g/l) was observed

at 48 h after parturition. Camel milk and colostrum were shown to be rich in protective proteins, especially IgG2 and IgG3, which revealed to be a potential source of inhibitory antibodies.

Descriptors: dromedary camels, females, maternal milk, colostrum, chemical composition, whey proteins, lactation, postpartum period, temporal variation, lactoglobulins, serum albumin, immunologic factors, immunoglobulin G, lactoferrin, proteose peptones, liquid chromatography, polyacrylamide gel electrophoresis.

El Khawas, KM; Abo Zeid, SM; Abo Elmagd, MK. **A pilot study on copper level among domestic animals in Ismailia Governorate.** *Assiut Veterinary Medical Journal.* 2007; 53(114): 207-214. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: Monitoring levels of mineral concentrations in animal tissues is important for assessing the effect of contamination on animal health and safety of animal products in human nutrition. This study evaluated the levels of copper in cattle, buffaloes, camels, sheep and goats reared in Ismailia Governorate, Egypt. Samples of 303 animals aged 6-36 months were collected from the Governorate slaughterhouse at slaughtering and analysed after acid digestion using atomic absorption spectrophotometry (AAS). The mean concentrations obtained per wet weight (ppm) for liver, kidney, muscle, hair and serum were 31.33, 10.87, 5.55, 7.44 and 0.90 in camels; 27.61, 6.01, 4.10, 7.84 and 0.79 in buffaloes; 25.10, 5.61, 4.52, 6.92 and 0.78 in cows; 37.44, 8.08, 7.235, 10.03 and 0.75 in sheep and 25.23, 3.62, 4.75, 6.33 and 0.64 in goats. The highest concentration of copper was in the liver while the lowest was in hair for all animals. These results indicate that sheep have the highest liver copper concentrations, followed by camels, buffaloes, goats and cows.

Descriptors: buffaloes, dromedary camels, goats, sheep, cattle, copper levels, species comparison, atomic absorption spectrophotometry, blood chemistry, hair, kidneys, liver, muscles, tissue distribution, trace element.

El Nadi, AH; Al Torki, AI. **Chemical and biochemical composition of pregnant camel urine (*Camelus dromedarius.*** *International Journal of Biology and Biotechnology*. 2007; 4(4): 433-435. ISSN: 1810-2719

Abstract: Urine samples from 23 pregnant dromedaries were analysed by gas chromatography-mass spectrometry (GC-MS) under optimum conditions. Sulfur, oxygen and nitrogen heterocyclic aromatic compounds belonging to thiophene, furan, pyridine and quinoline were identified along with their aliphatic non-aromatic derivatives, with the sulfur containing compounds being most dominant. Some aromatic hydrocarbons as well as their halogen and alkyl derivatives were also identified, including benzene, naphthalene, anthracene and phenanthrene. Organometallic compounds, namely chlorotrimethyltin (CH3)3 SnCl, triethylfluorotin (C2H5)3 SnF and 2-methyl seleno-selenophene C5Se2H6 were also identified along with the constituents of the very complex matrix. The number of compounds identified exceeded 30 with molecular weight ranging between 220-490. However, none of the volatile fatty acids which are usually used for pheromonal function were detected in any of the urine samples analysed. These findings are explained. Reproduced with permission of CAB.

Descriptors: dromedary camels, animal behavior, aromatic compounds, aromatic hydrocarbons, benzene, chemical composition, communication between animals, furans, GC MS,

heterocyclic nitrogen compounds, heterocyclic oxygen compounds, naphthalene, nitrogen, organometallic compounds, oxygen, phenanthrene, pheromones, pregnancy, pyridines, quinoline, sulfur, thiophene, urine, urine analysis, volatile fatty acids, animal behavior, anthracene, aromatics, behavior, elemental sulphur, gas chromatography mass spectrometry gestation.

Fourrat, L; Iddar, A; Soukri, A. **Purification and characterization of cytosolic glyceraldehyde-3-phosphate dehydrogenase from the dromedary camel.** *Acta Biochimica et Biophysica Sinica*. 2007; 39(2): 148-154. ISSN: 1672-9145
URL : http://www.blackwell-synergy.com/doi/pdf/10.1111/j.1745-7270.2007.00256.x
Abstract: Glyceraldehyde-3-phosphate dehydrogenase (GAPDH) (EC 1.2.1.12), a key enzyme of carbon metabolism, was purified and characterized to homogeneity from skeletal muscle of Camelus dromedarius. The protein was purified approximately 26.8 folds by conventional ammonium sulphate fractionation followed by Blue Sepharose CL-6B chromatography, and its physical and kinetic properties were investigated. The native protein is a homotetramer with an apparent molecular weight of approximately 146 kDa. Isoelectric focusing analysis showed the presence of only one GAPDH isoform with an isoelectric point of 7.2. The optimum pH of the purified enzyme was 7.8. Studies on the effect of temperature on enzyme activity revealed an optimal value of approximately 28-32 degrees C with activation energy of 4.9 kcal/mol. The apparent K< sub>m</ sub> values for NAD+ and DL-glyceraldehyde-3-phophate were estimated to be 0.025+or-0.040 mM and 0.21+or-0.08 mM, respectively. The V< sub>max</ sub> of the purified protein was estimated to be 52.7+or-5.9 U/mg. These kinetic parameter values were different from those described previously, reflecting protein differences between species. Reproduced with permission of CAB.
Descriptors: dromedary camels, characterization, chromatography, enzyme activity, genes, glyceraldehyde-3-phosphate-dehydrogenase, kinetics, molecular conformation, molecular weight, nucleotide sequences, pH, phylogeny, proteins, purification, skeletal muscle, structure activity relationships, hydrogen ion concentration, potential of hydrogen.

Fyiad, AA; Khafagy, EZ. **Isolation and some properties of camel pancreatic kallikrein.** *Journal of Applied Sciences Research.* 2007; (October): 1223-1228. ISSN: 1816-157X
URL: http://www.insinet.net/jasr/2007/1223-1228.pdf
Abstract: Camel pancreatic kallikrein (CPK) has been isolated and purified by a simple reproducible method including: complete delipidation of pancreas homogenate by solvent extraction, ammonium sulfate fractionation, chromatography on DEAE-cellulose and gel filtration on Sephadex G-100, the purification steps increased the enzyme activity about 149 folds. The homogeneity and purity of the enzyme was confirmed by SDS-PAGE and the molecular weight of the purified enzyme was determined and found to be 41 KDa. Optimum pH and temperature for hydrolysis of N alpha -toluenesulfonyl-l-arginine methyl ester (TAME) by the purified (CPK) were 8.5 and 37 degrees C, respectively. The effects of temperature, pH, stability of the enzyme (thermostability and the effect of storage at different periods), incubation period, different substrates and mineral ions on camel pancreatic kallikrein activity were studied. CPK was inhibited by heavy metal ions such as Zn2+, Hg2+, Cd2+. The camel pancreatic kallikrein was inhibited by potato kallikrein inhibitor (PKI-56) as well as diisopropylfluorophosphate (DFP). Reproduced with permission of CAB.

Descriptors: dromedary camels, cadmium, chromatography, enzyme activity, enzymes, isolation, kallikrein, cadmium, mercury, zinc, pancreas, pH, temperature, hydrogen ion concentration, potential of hydrogen.

Gahlot, TK (Editor). ***Proceedings of the International Camel Conference "Recent trends in Camelids research and Future strategies for saving Camels", Rajasthan, India, 16-17 February 2007.*** published by Rajasthan, India: College of Veterinary & Animal Science. 2007; iii + 226 pp.

Abstract: A total of 78 papers presented at the International Camel Conference are included in this supplement. The topics discussed include disease diagnosis and treatment, breeding and genetics, immunology, microbiology, reproduction, ethnoveterinary practice, camel husbandry, management practices, nutrition, surgery, anatomy, physiology, pharmacology, milk, draft power, production and parasitology. Reproduced with permission of CAB.

Descriptors: Bactrian camels, dromedary camels, camel milk, anatomy, breeding camel diseases, camel husbandry, nutrition, physiology, bacterial diseases, diagnosis, draft animals, genetics, immunology, parasitology, parasitoses, pharmacology, therapeutics, viral infections, reproduction, surgery, therapy, veterinary practice, viral diseases, working animals.

Gheisari, HR; Shekarforoush, SS; Aminlari, M. **Comparative studies on calpain activity of different muscles of cattle, camel, sheep and goat.** *Iranian Journal of Veterinary Research.* 2007; 8(3): 225-230. ISSN: 1728-1997. Note: In English with a Persian summary.

URL: http://www.shirazu.ac.ir/en/index.php?page_id=60

Abstract: Tenderness is the single most important factor influencing consumer acceptance of meat. The calpain proteolytic system is known to be responsible for the post-mortem tenderization of meat. The purpose of this study was to determine and compare the tensile strength and total calpain activities in different muscles of camel, cattle, sheep and goat. In camels, the effect of age and sex of animal was also studied. Twenty-four animals (camel, cattle, sheep and goat) were sampled randomly after slaughtering. Samples from biceps femoris, longissimus dorsi and triceps brachii and heart were obtained from each animal. The tensile strength was calculated using an Instron Universal testing machine. After homogenization of samples in 0.1 M NaCl and centrifugation, total calpain activity was determined by fluorometric method. Despite significant differences in tensile strength, no significant difference ($P>0.05$) was observed among calpain activities of different muscles in each species. Inter-species differences however, were significant ($P<0.05$). In all muscles, the highest calpain activity was found in camel (3.08-5.36 RFU/mg protein) followed by cattle (3.65-4.43 RFU/mg protein), sheep (1.17-2.82 RFU/mg protein) and goat (1.24-2.23 RFU/mg protein). No significant differences were observed between camel and cattle and also between sheep and goat in tensile strength ($P>0.05$). In camel, adult animals had higher calpain activity and tensile strength than youngs; sex had no significant effects. Correlation coefficients of calpain activity and tensile strength were negative and not significant in all species. In conclusion, meats from different species might show different degrees of tenderness, partly due to the difference in their calpain activity.

Descriptors: dromedary camels, goats, sheep, cattle, age differences, enzyme activity, enzymes, calpain activity meat composition, meat quality, sensory evaluation, sex differences, skeletal muscle, tenderness.

Gorak (h?) Mal; Sena, DS. **Milk composition among different breeds of camel.** *Indian Veterinary Journal.* 2007; 84(10): 1064-1065. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Descriptors: camels, Bikaneri, Jaisalmeri, Kachchhi, lactating females, breed differences, milk composition, comparison study, milk protein, casein, milk fat, pH, ash, total solids, solids not fat.

Gorakh Mal; Sena, DS; Sahani, MS. **Changes in chemical and macro-minerals content of dromedary milk during lactation.** *Journal of Camel Practice and Research.* 2007; 14(2): 195-197. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The present study aims to know the chemical and macro-minerals composition of the camel milk. The chemical composition of camel milk revealed higher pH, protein, casein, fat and total solids in the late phase of lactation, while vitamin-C content was higher in early phase of lactation. The macro-minerals composition revealed higher levels of sodium, potassium, calcium, phosphorus and magnesium in late phase of lactation. The vitamin-C content in camel milk is high, compared to cow's milk. These findings clearly reflect that the milk composition varies with stage of lactation. Reproduced with permission of CAB.
Descriptors: dromedary camels, lactating females, camel milk composition, ascorbic acid, calcium, casein, magnesium, milk fat, milk protein, mineral content, pH, phosphorus, potassium, protein content, sodium, butterfat, hydrogen ion concentration, milk constituents, potential of hydrogen, vitamin C.

Kamal, AM; Salama, OA; El Saied, KM. **Changes in amino acids profile of camel milk protein during the early lactation**. *International Journal of Dairy Science.* 2007; 2(3): 226-234. ISSN: 1811-9743
Abstract: The aim of the present study was to characterize the changes occurring in the amino acid profile of camel milk protein during the 1st month of lactation and seek to justify such dynamics of change in relation to the specific needs of growing neonates. Milk samples were collected from camels at varying stages of lactation from the 1st day until 30th day of parturition. Daily samples were tested for fat, protein, lactose, ash and total solids. The respective mean values at parturition were 0.50+or-0.06, 12.99+or-0.20, 2.75+or-0.40, 0.96+or-0.037 and 20.25+or-2.50%, whereas at the 30th day, the respective mean values were 3.78+or-0.68, 3.30+or-0.25, 5.85+or-0.43. 0.70+or-0.040 and 15.06+or-1.45%. The different amino acid mean values on the 1st day were significantly increased then sharply decreased on the 3rd day and continuously decreased until the 5th day. A slight decrease was observed on the 7th day. An insignificant decrease in the remaining times was observed (10, 15, 21 and 30 days, respectively). A significant increase in the level of serum insulin growth factor-1 was observed at zero time, which began to decrease until 30 days. At the same time, concentrations of triiodothyronine and thyroxine were very high at birth and then decreased to relatively low concentrations on day 30. This study demonstrated that camel milk during the 1st month of lactation had important effects on the clinical, metabolic and endocrinological traits.
Descriptors: dromedary camels, camel milk, amino acids, ash, insulin like growth factor,

lactation, lactation stage, lactose, milk composition, milk fat, butterfat, milk protein, parturition, thyroxine, total solids, triiodothyronine, butterfat, liothyronine, milk constituents, milk sugar, somatomedin C.

Kataria, Nalini; Kataria, Anil Kumar; Agarwal, Virendra Kumar; Garg, Sohan Lal; Sahni, Mohan Singh. **Opterecenje tekucinom i prijenosna sposobnost bubrega u dvogrbe deve u dehidraciji i rehidraciji zimi i ljeti. [Solute loads and transfer function of kidney in dromedary camel during dehydration and rehydration in winter and summer.]** *Veterinarski Arhiv.* 2007; 77(3): 237-246. ISSN: 0372-5480
Descriptors: dromedary camel, healthy adult females, effects of dehydration and rehydration, comparison study on winter and summer seasons, dehydration 24 days in winter, 13 days dehydration in summer, solute loads, transfer function of kidney, plasma loads, tublar loads, glucose, proteins, urea, creatinine, sodium, potassium, chloride, calcium, phosphorus, water adlibitum in rehydration, plasma held more water and solutes.

Kataria, Nalini ; Kataria, A K; Agarwal, VK; Garg, SL; Sahni, MS. **Solute loads and transfer function of kidney in dromedary camel during dehydration and rehydration in winter and summer.** *Veterinarski Arhiv* . 2007; 77(3): 237-246. ISSN: 0372-5480. Note: In English with Croatian.
URL: http://www.vef.hr/vetarhiv
Abstracts: The effect of dehydration and rehydration was studied during winter and summer on solute loads and transfer function of kidney in healthy adult female dromedary camels. Kidney solute loads (KSLs) which included plasma loads (PL) and tubular loads (TL) were determined for glucose, proteins, urea, creatinine, sodium, potassium, chloride, calcium and phosphorus. The dehydration period was of 24 days in winter and 13 days in summer. Water was provided ad libitum during control and rehydration periods and was restricted completely during dehydration period. The mean value of TFK during summer control was significantly (P<=0.05) lower than that in winter control. In winter the mean values of TFK during rehydration phases differed significantly (P<=0.05) from control values. A similar trend was observed during summer, except that the calculations for TFK could not be made at hour 1/2 and at hour 2 of rehydration since animals did not void urine. During dehydration periods in both seasons PL and TL mean values decreased significantly (P<=0.05) from respective control mean values. It was concluded that during dehydration reduction in kidney solute loads was indicative of the water conservation ability of camels because reduced plasma loads and tubular loads resulted in trapping of constituents in the plasma to hold more water. Reproduced with permission of CAB.
Descriptors: dromedary camels, draft camels, working camels, healthy adult females, dehydration and rehydration effects, seasonal differences, summer, winter, kidney functions, blood protein, plasma protein, calcium, chloride, creatinine, dehydration physiological, glucose, dextrose, kidney transplant, solute loads, phosphorus, potassium, sodium, urea, animal welfare concerns.

Kataria , AK . **Camel immunology: myths and facts.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 63-67.

Abstract: Camel has a low susceptibility to diseases and suffers comparatively with lesser infections. The low susceptibility of camel to pathogens has led to a belief that camel's immune system is either more potent in combating the infections or is unique and different from other mammalian species. But as camel is confined to only some parts of the world where due scientific attention has not been paid, only little research has accumulated on this species. The earliest information remained limited to estimation of total serum proteins followed by reports on fractionation of serum proteins and quantification of immunoglobulins. Afterwards, much attention of the scientists throughout the globe remained confined to detection of serum antibodies developed against common diseases. But the important discovery about presence of unusual heavy chain antibodies (HCAbs or nanobodies) in serum of camel ignited the interest in camel research throughout the world and henceforth, lot of work has been carried out on the camel immunoglobulins and their properties. The immunology of camel has been studied more in regards to its immunoglobulins with specific emphasis on heavy chain antibodies. Functional heavy chain immunoglobulins have, so far, only been found in camels and llamas. The HCAbs constitute approximately 75% of the IgG in camel serum. In my opinion, there are no myths about camel's immunology but only facts prevail. The paper reviews some important aspects of camel immunology in terms of isolation and identification of immunoglobulins and structure, physico-chemical properties, antigen-binding properties, antimicrobial activities, evolution and application of nanobodies. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, antibodies, disease resistance, IgG, immune system, immunity, immunoglobulins, immunology, susceptibility, gamma globulins, immune globulins, resistance to disease.

Khalil, MH; Al Sobayil, KA; Al Saef, AM; Mohamed, KM; Salal, SA. **Genetic aspects for milk traits in Saudi camels.** *Journal of Camel Practice and Research.* 2007; 14(1): 55-59. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A total of 269 lactation records for Saudi Arabian she-camels were genetically analysed and evaluated for lactation traits of milk yield of the first three months of lactation, annual milk yield, total milk yield, length of lactation period, monthly milk yield and daily milk yield. Data were analysed using DFREML procedure to estimate direct additive effects (i.e. direct heritabilities), permanent environment and random errors. Breeding values of camels with and without records in this population were predicted for lactation traits using an animal model. Heritabilities were moderate and ranged from 0.08-0.25. Ratios of permanent environment were also moderate and ranged from 0.16-0.22. The ranges in breeding values for the animals with and without records were moderate or high, e.g. 166.8 kg, 1312 kg, 1436 kg, 282 day, 121.2 kg and 3.044 kg for 3-month milk yield, annual milk yield, total milk yield, lactation period, monthly milk yield and daily milk yield, respectively. Accuracies of breeding values recorded for lactation traits were high and was 0.42-0.76. The percentage of animals that had positive estimates of breeding values for all traits were nearly similar and was 53.3-57.30%. The rates of selection responses predicted were moderate or high, where these rates ranged from 3.1 to 9.6%, relative to the actual mean of the trait. Reproduced with permission of CAB.
Descriptors: dromedary camels, heritable characters, lactation duration, milk production,

milk yield, performance traits, breeding value, environmental factors, genetic analysis, genetic factors, heritability, Saudi Arabia.

Konuspayeva, G; Faye, B; Loiseau, G; Levieux, D. **Lactoferrin and immunoglobulin contents in camel's milk (*Camelus bactrianus*, *Camelus dromedarius*, and hybrids) from Kazakhstan.** *Journal of Dairy Science.* 2007 Jan; 90(1): 38-46. ISSN: 0022-0302
URL: http://jds.fass.org/cgi/content/abstract/90/1/38
NAL call no: 44.8 J822
Abstract : Lactoferrin (Lf) and IgG were estimated in camel's milk from Kazakhstan, where 2 species of camels (*Camelus bactrianus*, *Camelus dromedarius*) and their hybrids cohabit. The concentrations of Lf and IgG were determined according to 3 variation factors: region (n = 4), season (n = 4), and species (n = 5; sample 4 was mixed milk and sample 5 was of unknown origin). The mean values in raw camel's milk were 0.229 pl 0.135 mg/mL for Lf concentration and 0.718 pl 0.330 mg/mL for IgG concentration. The seasonal effect was the only significant variation factor observed, with the highest values in the spring for Lf and in the winter for IgG. The Lf concentration varied in 1-wk postpartum milk from 1.422 to 0.586 mg/mL. The range in IgG concentration was wide and decreased from 132 to 4.75 mg/mL throughout the 7 d postpartum, with an important drop after parturition. In fermented milk, the lactoproteins are generally hydrolyzed. For milk samples from undefined species, discriminant analyses did not allow the origin of the species to be determined. A slight correlation between Lf and IgG concentrations was observed in raw milk. The values were slightly higher than those reported in cow's milk, but this difference was insufficient to attribute medicinal virtues to camel's milk.
Descriptors: dromedary camels, Bactrian camels, hybrid camels, camel milk, raw milk, milk composition, lactoferrin, immunoglobulin G, species differences, geographical variation, seasonal variation, spring, winter, postpartum period, parturition, fermented milk, milk proteins, proteolysis, Kazakhstan.

Lokesh Gupta; Tiwari, G S; Chaudhary, JL. **Effect of feeding different levels of energy on draught performance and physiological responses in camels.** *Indian Veterinary Journal.* 2008; 85(8): 869-871. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Nine draught camels, 8-10 years old, were equally divided into three groups and fed with ad libitum moth straw (*Phaseolus acontifolius*)+65% TDN (T1), ad libitum moth straw+70% TDN (T2) and ad libitum moth straw+75% TDN (T3) in concentrate mixture. Results revealed that camels fed with ad libitum moth straw+75% TDN level showed improved DM, DCP and TDN intake. The average speed and power developed was significantly higher in T3 when compared with T1 and T2. It was observed that camels tolerated the work stress without any apparent adverse effect on physiological responses when fed with higher energy diets. It is suggested that draught camels should be supplemented with extra energy for added draught power.
Descriptors: dromedary camels, diets, different levels ofenergy content in feed, energy intake, nutrient intake, plane of nutrition, heat stress, stress response.

Makhdoomi, DM; Shakeel Ahmad; Kirmani, MA; Banik, S; Sheikh, GN. **Physico-anatomical characteristics of Bactrian versus dromedary with special reference to Ladakh Bactrian.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 166-167.

Abstract: The Bactrian of Ladakh is believed to be originated from those amongst the Bactrian of China and Mongolia. At a high altitude it got acclimatised to the environment where low oxygen tension and ambient temperatures are the main stress factors for human life to the extent that it became resistant to high altitude diseases. Accordingly the physiological and anatomical features differ from the Bactrian of Mongolia, China and dromedary camel. The paper aims to put on the record some of the physico-anatomical characteristics of Ladakh Bactrian and their comparison with the dromedary camel. Reproduced with permission of CAB.

Descriptors: LadakhBactrian camels, Bactrian camels, dromedary camels, species origins, species comparison,animal anatomy, morphology, species differences.

Makhdoomi, DM; Shakeel Ahmad; Kirmani, MA; Banik, S; Sheikh, GN. **Physico-anatomical characteristics of Bactrian versus dromedary with special reference to Ladakh bactrian.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 166-167.

Abstract: The Bactrian of Ladakh is believed to be originated from those amongst the Bactrian of China and Mongolia. At a high altitude it got acclimatised to the environment where low oxygen tension and ambient temperatures are the main stress factors for human life to the extent that it became resistant to high altitude diseases. Accordingly the physiological and anatomical features differ from the Bactrian of Mongolia, China and dromedary camel. The paper aims to put on the record some of the physico-anatomical characteristics of Ladakh Bactrian and their comparison with the dromedary camel. Reproduced with permission of CAB.

Descriptors: LadakhBactrian camels, Bactrian camels, dromedary camels, species origins, species comparison,animal anatomy, morphology, species differences.

Mohamed, L; Mukhtar, MM. **Optimum Ficoll/Hypaque gradient for efficient isolation of peripheral blood monocytes from camels.** *Journal of Animal and Veterinary Advances*. 2007; 6(2): 152-154. ISSN: 1680-5593

Abstract: This study was conducted to develop an efficient method for the isolation of pure, viable and adequate number of camel monocytes that could be further subjected to different in vitro immunological studies. 10 ml blood samples were collected from the jugular vein of camels (n=8). The viability, purity and number of monocytes of the peripheral blood were assessed after isolation from 9, 10 and 12% concentrations of Ficoll/Hypaque. Results revealed that 97% viable cells were obtained using the three Ficoll/Hypaque concentrations. Cells from the 12% Ficoll/Hypaque were contaminated with other blood cells, while those obtained from the 9 and 10% Ficoll were pure. The highest number of pure cells were obtained from the 10% Ficoll/Hypaque concentration. Isolated cells responded well to phytohaemagglutinin mitogen stimulation. The optical density of the cells stimulated

with phytohaemagglutinins was significantly higher than the optical density of cells without stimulants. It is concluded that the 10% Ficoll/Hypaque concentration provides the most effective tool for isolation of viable, pure and adequate number of camel peripheral blood cells that can be used for studying the functional activities of these cells. Reproduced with permission of CAB.
Descriptors: dromedary camels, absorbance, hematology, isolation techniques, monocytes, phytohaemagglutinins, purity, techniques, hematology, optical density, phytohemagglutinins.

Mohamed, SA; Fahmy, AS; Salah, HA. **Disaccharidase activities in camel small intestine: biochemical investigations of maltase-glucoamylase activity**. *Comparative Biochemistry and Physiology B, Biochemistry and Molecular Biology*. 2007; 146(1): 124-130. ISSN: 1096-4959
DOI: http://dx.doi.org/10.1016/j.cbpb.2006.10.001
Abstract: Disaccharidases (maltase, cellobiase, lactase, and sucrase), alpha -amylase, and glucoamylase in the camel small intestine were investigated to integrate the enzymatic digestion profile in camel. High activities were detected for maltase and glucoamylase, followed by moderate levels of sucrase and alpha -amylase. Very low activity levels were detected for lactase and cellobiase. Camel intestinal maltase-glucoamylase (MG) was purified by DEAE-Sepharose and Sephacryl S-200 columns. The molecular weight of camel small intestinal MG4 and MG6 were estimated to be 140 000 and 180 000 using Sephacryl S-200. These values were confirmed by SDS-PAGE, where the two enzymes migrated as single subunits. This study encompassed characterization of MGs from camel intestine. The Km values of MG4 and MG6 were estimated to be 13.3 mM and 20 mM maltose, respectively. Substrate specificity for MG4 and MG6 indicated that the two enzymes are maltase-glucoamylases because they catalysed the hydrolysis of maltose and starch with alpha -1,4 and alpha -1,6 glycosidic bonds, but not sucrose with alpha -1,2 glycosidic bond which was hydrolyzed by sucrase-isomaltase. Camel intestinal MG4 and MG6 had the same optimum pH at 7.0 and temperature optimum at 50 degrees C and 40 degrees C, respectively. The two enzymes were stable up to 50 degrees C and 40 degrees C, followed by strong decrease in activity at 60 degrees C and 50 degrees C, respectively. The effect of divalent cations on the activity of camel intestinal MG4 and MG6 was studied. All the examined divalent cations Ca2+, Mn2+, Mg2+, Co2+ and Fe3+ had slight effects on the two enzymes except Hg2+ which had a strong inhibitory effect. The effect of different inhibitors on MG4 and MG6 indicated that the two enzymes had a cysteine residue. Reproduced with permission of CAB.
Descriptors: alpha amylase, alpha glucosidase, beta galactosidase, cysteine, digestion, disaccharides, dromedary camels, enzyme activity, glucan-1,4-alpha-glucosidase, hydrolysis, iron, magnesium, maltose, calcium, cobalt, manganese, mercury, small intestine, starch, sucrose alpha glucosidase.

Mohammed, AK; Sackey, AKB; Tekdek, LB; Gefu, JO. **Serum biochemical values of healthy adult one humped camel (*Camelus dromedarius*) introduced into a sub-humid climate in Shika - Zaria, Nigeria.** *Journal of Camel Practice and Research.* 2007; 14(2): 191-194. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Eleven adult dromedaries introduced into a sub-humid climate were bled monthly for 36 months to establish mean serum biochemical reference values for the zone. Mean

sodium concentration was 144.57+or-1.31 mmol/l, potassium 5.03+or-0.42 mmol/l and chloride 104.06+or-2.05 mmol/l. Others were bicarbonate 23.57+or-1.04 mmol/l, calcium 2.39+or-0.05 mmol/l and phosphate 1.07+or-0.04 mmol/l. The urea value was 4.92+or-0.55 mmol/l and that of creatinine was 85.70+or-8.85, while glucose had 2.62+or-0.18 mmol/l, total protein 64.94+or-1.55 g/l and albumin 33.98+or-0.98 g/l. The male camels had significantly (P<0.05) higher potassium and creatinine levels while urea, total protein and albumin values were higher (P<0.05) in the she-camels. Wet season samples had higher (P<0.05) blood urea nitrogen, creatinine and glucose values while potassium was insignificantly (P>0.05) higher in the dry season samples. Reproduced with permission fo CAB.
Descriptors: dromedary camels, bicarbonates, blood chemistry, blood protein, plasma protein, blood serum, blood sugar, calcium, chloride, creatinine, heat stress, phosphate, potassium, seasonal variation, serum albumin, sodium, urea, seasonal fluctuation.

Mohammed, AK; Sackey, AKB; Tekdek, LB; Gefu, JO. **Comparative assessment of draught performance of the one humped camel (*Camelus dromedarius*) and Bunaji work bulls in Zaria, Nigeria.** *Journal of Camel Practice and Research*. 2007; 14(2): 199-202. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The study was carried out to evaluate the draught performance of the dromedary and Bunaji work bulls as draught animals for ridging, ploughing and weeding operations in a sub-humid environment of Nigeria. 4 work dromedaries singly harnessed and 8 Bunaji work bulls yoked in pairs were used for the evaluation. The camel's mean weight was 450+or-12.8 kg while a pair of bulls weighed 760+or-15.4 kg. The animals were made to plough, ridge and weed an area of 1500 m2 of uncultivated flat land. The absolute draught force produced by one dromedary for ridging (0.80 kN), weeding (0.36 kN) and ploughing (0.18 kN) were not significantly different (P>0.05) from that produced by a pair of work bulls (0.79 kN, 0.30 kN, 0.30 kN) for same operations, although the live weight of a pair of work bulls (760+or-15.4 kg) was significantly (P<0.01) higher than that of a single dromedary (450+or-12.8 kg). The bulls ridged 0.23 ha of land per hour (1 ha/4.4 hours) which was significantly (P<0.01) faster than the camel's 0.18 ha per hour (1 ha/5.3 hours). It is thus conclusive from this study that, the one humped camel can be efficiently utilised as an alternative draught ruminant in the sub-humid savannah zone of Nigeria. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bunaji work bulls, draft camels, animal power, liveweight, working camels, Nigeria.

Mohammed, AK; Sackey, AKB; Tekdek, LB; Gefu, JO. **Serum biochemical values of healthy adult one humped camel (*Camelus dromedarius*) introduced into a sub-humid climate in Shika-Zaria, Nigeria.** *Journal of Animal and Veterinary Advances.* 2007; 6(5): 597-600. ISSN: 1680-5593
Abstract: Eleven adult dromedaries introduced into a sub-humid climate were bled monthly for 36 months to establish the mean serum biochemical reference values for the zone. The mean concentration of sodium, potassium, chloride, bicarbonate, calcium and phosphate were 144.57+or-1.31, 5.03+or-0.42, 104.06+or-2.05, 23.57+or-1.04, 2.39+or-0.05 and 1.07+or-0.04 mmol/litre. The urea and creatinine values were 4.92+or-0.55 and 85.70+or-8.85 mmol/litre, while glucose, total protein and albumin were 2.62+or-0.18 mmol/litre, 64.94-+or-1.55 and 33.98+or-0.98 g/litre. Male camels had significantly (p<0.05) higher

potassium and creatinine levels while urea, protein and albumin values were higher ($p<0.05$) in female camels. Wet season samples had higher ($p<0.05$) blood urea nitrogen, creatinine and glucose values while potassium was insignificantly ($p>0.05$) higher in the dry season samples. Reproduced with permission of CAB.

Descriptors: dromedary camels, adult animals, sex differences, baseline blood values, blood chemistry, hematology, bicarbonates, blood plasma protein, blood sugar, calcium, chloride, creatinine, haematology, nitrogen, phosphate, potassium, serum albumin, seasonal variation, serum albumin, sodium, urea, Nigeria.

Mohammed, AK; Sackey, AKB; Tekdek, LB; Gefu, JO. **The effects of season, ambient temperature and sex on rectal temperature, pulse and respiratory rates for the adult one humped camel (*Camelus dromedarius*) in Shika-Zaria, Nigeria.** *Journal of Animal and Veterinary Advances.* 2007; 6(4): 536-538. ISSN: 1680-5593

Abstract: A three year study on the effects of season, ambient temperature and sex on rectal temperature, pulse and respiratory rates (adaptive physiological parameters) of adult one humped camel (*Camelus dromedarius*) was conducted in Shika-Zaria a sub-humid zone of Nigeria. The average rectal temperature (T), pulse (P) and respiratory (R) rates commonly referred to as TPR were 37.0 degrees C, 48.6 beats/min and 15.5 breaths/min, respectively, while the ranges were 35.0-40.0 degrees C, 30-57 beats/min and 8-23 breaths/min, respectively. Average TPR values were significantly lower ($p<0.05$) during the cold season than during the dry season and there were no significant differences ($p>0.05$) between the sexes. The ambient temperature significantly ($p<0.01$) influenced the TPR readings with lower values during morning hours than the afternoon hours. Reproduced with permission of CAB.

Descriptors: dromedary camels, adult camels, body temperature, environmental temperature, pulse rate, respiration rate, seasonal variation, sex differences, Nigeria.

Moutaouakil, F; Bengoumi, M. **Plasma thyroid hormones levels after maximal exercise in dromedary camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2007; 14(1): 75-78. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Osmolality, plasma triiodothyronine (T3) and thyroxine (T4) were determined by freezing point, microparticular enzymatic immunoassay (MEIA) and fluorescence polarization immunoassay (FPIA), respectively, in male dromedary camels (n=5), 3-5 years old, weighing 275+or-15 kg (mean+or-SEM), before and after 4 km of racing (15 min, 3, 6, 12 and 24 h) at maximum speed (6.3 m/second=22.6 km/h), before feeding in the morning, when the ambient temperature was approximately 25 degrees C. There were significant increases in osmolality ($P<0.05$), plasma T3 ($P<0.01$) and T4 ($P<0.01$) and T3/T4 ratio ($P<0.05$). Osmolality returned to pre-exercise levels within 3 h of completion, T3/T4 ratio in 6 h, T3 and T4 in 24 h post-exercise. The different evolution of these parameters suggested that the maximal exercise act on thyroid hormones not through plasmatic volume variations, but directly on their activities pathways (secretion, mobilization and metabolism). Reproduced with permission of CAB.

Descriptors: dromedary camels, racing camels, blood chemistry, enzyme immunoassay, exercise, osmotic pressure, thyroxine, triiodothyronine, liothyronine.

Nagpal, AK; Singh, GP; Saini, N; Jayant, P. **Voluntary feed intake, serum profile, growth performance, and economics of weaned camel calves.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 153-155.
Abstract: Six camel calves (3 Jaisalmeri and 3 Kutchchi) were weaned at 3 months of age. The calves had average body weight of 132.4 kg at 4.5 months of age and were raised on dry chaffed *Cyamopsis tetragonoloba* ad.lib. and weighed quantity of *Cynodon dactylon* grass and concentrate mixture till 9 months of age. Average voluntary dry matter intake was 3.60 kg/d or 2.31 kg/100 kg DMI. Significant (P<0.05) lower serum total protein, urea and triglycerides levels but higher levels of phosphorus and chloride levels at 6th month of age than at 9th month of age were observed. The calves gained 56 kg over 139 days or 402.83 g/d with feed efficiency (DMI kg/kg body weight gain) of 8.78. The results indicated that weaning was more economical and resulted in saving of Rs. 2310. Reproduced with permission of CAB.
Descriptors: camel calves, Jaisalmeri and Kutchchi breeds, weaned animals, camel feeding, blood chemistry, blood plasma proteins, chloride, cluster beans, costs, diets, feed conversion efficiency, feed intake, Bermuda grass, *Cyamopsis tetragonoloba, Cynodon dactylon*, growth rate, guar, liveweight gain, nitrogen, phosphorus, savings, costings, triacylglycerols, blood proteins.

Nagpal, K. **Nutrient utilisation and performance of pregnant camels kept on different levels of protein.** *Journal of Camel Practice and Research.* 2007; 14(1): 79-82. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Twelve pregnant camels (9-12 years old, 564.67+or-13.47 kg) in their 2-3 parity were randomly distributed into 3 groups and were kept on a diet consisting of guar straw, groundnut haulms and concentrate mixture to provide 9.5 (Gp1), 10.5 (Gp2) and 12% crude protein (CP, Gp3) at 50% total digestible nutrient (TDN) level. The dry matter (DM) intake kg/100 kg body weight was 1.53 in Gp1, 1.61 in Gp2 and 1.65 in Gp3. Except for ether extract (EE), the digestibility of all proximate components was similar, being highest in Gp3 where high dietary CP was fed. The daily intake of DM, CP and TDN were 10.01+0.18 kg, 948.80+18.92 g and 4.945+0.13 kg in Gp1; 10.36+0.39 kg, 1094.63+38.12 g and 5.238+0.27 kg in Gp2 and 10.74+0.64 kg, 1264.83+81.66 g and 5.331+0.42 kg in Gp3, respectively. No statistical difference was observed between groups with respect of DM intake (DMI) and TDN intake (TDNI) g/kg W 0.75. The digestible CP (DCP) intake g/kg W 0.75 in Gp3 was 5.26 and was significantly (P<0.01) higher than the other 2 groups. The gain in body weight of pregnant camels during the last 4 months of pregnancy was significantly (P<0.01) different between groups and was 1.01, 1.22 and 1.44 kg/day in Gp1, Gp2 and Gp3, respectively. The loss in body weight of pregnant camels on calving was 14.79, 13.92 and 14.20% in Gp1, Gp2 and Gp3 groups, respectively. The average birth weight of camel calves was 43.25, 42.33 and 44.25 kg in these groups, respectively, indicating non-significant influence of nutrition level during pregnancy. The study indicated that the ration Gp1 providing 9.5% CP and 50% TDN may be fed to pregnant camels during the last quarter of pregnancy. Reproduced with permission of CAB.
Descriptors: dromedary camels, pregnancy, gestation, birth weight, live weight gain, camel feeding, camel nutrition, feed intake, crude protein, dietary protein, diets, digestibility, dry matter, ether extracts, nutrient requirements, nutrition physiology, nutritive value, proximate

analysis, total digestible, nutrients, dietary standards, food requirements, liveweight gains, nutritional requirements, nutritional value.

Ramadan, AA; El Behairy, AM; Mostafa, MA; Al Gabry, MA. **Biochemical characterization of inhibin hormone in the ovary of she camel (*Camelus dromedaries).*** *Assiut Veterinary Medical Journal.* 2007; 53(112): 1-18. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: The isolation, purification and advanced characterization of inhibin hormone in the ovary of female camel were aimed in this study. Pooled follicular fluid was collected from the ovaries of she camel irrespective to physiological status and age of the animals. Follicular fluid was subjected to 2 types of gel filtration chromatography. In Sephacryl S-200, three peaks of proteins were obtained. The suspected peak to contain inhibin (peak III) resolved from S-200 was subjected to Sephadex G-100 where three peaks were also obtained, the third peak was suspected to contain inhibin in pure form. To verify the purity of the isolated hormone, the lyophilized fraction containing inhibin was subjected to analysis by sodium dodecylsulfate-polyacrylamide gel electrophoresis (SDS-PAGE) under both non-reducing condition, stained with silver nitrate where a single band was resolved, and under reducing condition, where five bands were resolved (ranging between 58.8 to 32.3 KDa). Using Reversed Phase-High Performance Liquid Chromatography (RP-HPLC) to fractionate the third peak, subunits of inhibin hormone were eluted at different retention times. High Performance-Thin Layer Chromatography (HP-TLC) used to determine the N-terminal amino acids contents of the third peak and 7 amino acids resolved with different concentrations showed that histidine was the most abundant amino acid. Reproduced with permission of CAB.

Descriptors: female dromedary camels, ovaries, follicular fluid, folliculostatin, characterization, chromatography, inhibin, isolation, purification.

Roy, AK **Effect of biochemical, hormonal, and behavioral factors at the beginning of puberty in young male camels.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 89-96.

Abstract: Three camels each in the age group of 3-4 years with and without testes were taken up (Average Body weights: 427 and 414 kg) for the present study while the 3 adult camels (Average Body weight 637 kg) served as a control group. The skin thickness was recorded from the shoulder, mid abdomen and hind quarter regions periodically. It was 4.53, 5.93 and 4.53 mm; 3.03, 4.97 and 3.80 mm & 2.98, 4.50 and 3.5 mm, respectively in the adult, young and castrated (without testes) group of camels. The blood samples were drawn at quarterly intervals and the body features were recorded at monthly intervals. The blood biochemistry indicated that the glucose levels were higher in the young camels with and without testes (134 and 130 mg/dl) during non-rutting season in comparison to the rutting season (116 and 126 mg/dl). But in case of adult camels it was slightly higher (115 mg/dl) in the rutting season. Cholesterol and triglycerides levels remained high in the rutting season in all the three groups. Testosterone, T< sub>3</ sub> and T< sub>4</ sub> levels also indicated the similar trends. There was a positive effect in the improvement of libido of experimental males that were exposed to females before the onset of rutting season. Reproduced with per-

mission of CAB.
Descriptors: young male camels, breeding season, seasonal variation, camel behavior, blood chemistry, testosterone, blood sugar, blood glucose, cholesterol, libido, secondary sexual traits, sexual maturity, thyroxine, triacylglycerols, triiodothyronine, liothyronine, triglycerides.

Saleh, MA; El Mileegy, IMH; Abdel Salam, M. **Levels of thyroid hormones and their correlation with lipid and lipoprotein concentrations in blood serum of male camels (*Camelus dromedarius*) in the Egyptian oasis.** *Assiut Veterinary Medical Journal.* 2007; 53(112): 223-240. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: Thyroid dysfunction is an endemic condition in man and animals in the Egyptian oasis due to the environmental iodine deficiency. The aim of this work was to estimate the circulating thyroid hormone concentrations and their correlation with lipid and lipoprotein profile in the blood serum of male dromedary camels in the Egyptian oasis. Blood for serum collection was sampled from 92 randomly selected apparently healthy male camels, 2-10 years old (divided into 4 groups; 2-4, 4-6, 6-8 and 8-10 years) from their natural habitat in the periurban areas at El-Kharga oasis. The recorded overall mean values of blood serum triiodothyronine (T< sub>3</ sub>) and thyroxine (T< sub>4</ sub>) concentrations in dromedary camels were 1.179+or-0.03 and 80.59+or-2.27 nmol/litre, respectively. The effect of age of camels was not significant for both T< sub>3</ sub> (F=1.446, P=0.235) and T< sub>4</ sub> (F=2.014, P=0.096). The overall mean concentrations of blood serum lipids of camels were 369.0+or-7.504 mg/dl for total lipids, 0.898+or-0.028 mmol/litre for total cholesterol and 0.606+or-0.021 mmol/litre for triglycerides. The effect of the age of the camels was significant for total lipids (F=3.870, P=0.016), total cholesterol (F=3.987, P=0.011) and triglycerides (F=5.626, P=0.003). It was noticed that old camels (8-10 years) had the highest mean values of these blood serum lipids. The overall recorded mean values for lipoproteins was 0.462+or-0.023 mmol/litre for high density lipoprotein-cholesterol (HDL-C), 0.314+or-0.010 mmol/litre for low density lipoprotein-cholesterol (LDL-C) and 0.121+or-0.004 mmol/litre for very low density lipoprotein-cholesterol (VLDT-C). The age of camels had a significant effect on the mean concentrations of blood serum HDL-C (F=4.051, P=0.009), LDL-C (F=3.698, P=0.024) and VLDL-C (F=5.584, P=0.002). Aged camels (8-10 years) showed the highest values of HDL-C and VLDL-C, whereas LDL-C was highest in camels aged 4-8 years. The linear regression analysis revealed that the regression factor (R2) and correlation coefficient (r) between file estimated blood serum T< sub>3</ sub> concentrations and lipogram in blood serum of camels was not significant. Also R2 and r between T< sub>4</ sub> and total lipids, HDL-C and VLDL-C were not significant. On the other hand, there was significant inverse linear regression (R) and negative correlation (r) between T< sub>4</ sub> and each of total cholesterol (R2=0.167, r=-0.290, P=0.037), triglycerides (R2=0.193, r=-0.375, P=0.021) and LDL-C (R2=0.196, r=-0.397, P=0.015). It can be concluded that dromedary camels in the Egyptian oases have low values of circulating thyroid hormones. However, there were no apparent clinical signs of goitre. It seems that these camels are suffering from a state of subclinical hypothyroidism with a pronounced effect on lipid metabolism. Reproduced with permission of CAB.
Descriptors: dromedary camels, male animals, age differences, blood picture, blood serum, cholesterol, high density lipoprotein, hormone secretion, hypothyroidism, lipid metabolism,

lipids, lipoproteins, low density lipoprotein, thyroid hormones, thyroxine, triiodothyronine, very low density lipoprotein, Egypt.

Sena, DS; Gorakh Mal; Sahani, MS; Bhati, A. **Comparative studies on micromineral profile in camels.** *Indian Veterinary Journal.* 2007; 84(7): 698-700. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: The study was conducted in 15 camels comprising of 5 pregnant females in last month of pregnancy (Gr. I), 5 calves aged 1 month (Gr. II) and 5 dry female camels (Gr. III). The neonatal camel calves were maintained on dam's colostrum for the first 3 days and later with the milk of their corresponding dam. Gr. I and Gr. III camels were maintained under normal feeding schedule with ad lib drinking water. In all these animals micromineral or trace mineral estimations viz., copper, iron, zinc, molybdenum, manganese and cobalt were done using Atomic Absorption Spectrophotometer. No significant variation between groups was noticed for the microminerals copper and molybdenum. Significant difference ($P<0.01$) were noticed in the pregnant females in last month of pregnancy compared to the dry females in iron, zinc, manganese and cobalt concentrations. The iron and zinc levels showed significant variation at $P<0.05$ and the manganese and cobalt levels showed significance at $P<0.01$ in Gr. II and Gr. III.
Descriptors: dromedary camels, females, pregnancy, gestation, new born calves, colostrum, micro elements, trace elements, copper, cobalt, iron, manganese, Mn, molybdenum, MO, zinc.

Shah, MG; Qureshi, AS; Reissmann, M; Schwartz, HJ. **Sequencing and sequence analysis of myostatin gene in the exon 1 of the camel (*Camelus dromedarius*).** *Pakistan Veterinary Journal.* 2006; 26(4): 176-178
Abstract: Myostatin, also called growth differentiation factor-8 (GDF-8), is a member of the mammalian growth transforming family (TGF-beta superfamily), which is expressed specifically in developing adult skeletal muscles. The muscular hypertrophy allele (mh allele) in the double muscling breeds involved a mutation within the myostatin gene. Genomic DNA was isolated from camel hair using the NucleoSpin Tissue kit. Two animals each of the 6 camel breeds (Marecha, Dhatti, Larri, Kohi, Sakrai and Cambelpuri) were used for sequencing. For PCR amplification of the gene, a primer pair was designed from homologous regions of already published sequences of farm animals from GenBank. The camel myostatin possessed more than 90% homology with that of cattle, sheep and pig. The camel formed a separate cluster from the pig in spite of having high homology (98%) and showed 94% homology with cattle and sheep as reported in literature. Sequence analysis of the PCR-amplified part of exon 1 (256 bp) of the camel myostatin was identical among the 6 camel breeds. Reproduced with permission of CAB.
Descriptors: dromedary camels, myostatin, skeletal muscle, double muscling, muscular hypertrophy, mutations genes, alleles, DNA, DNA sequencing, exons, nucleotide sequences, transforming growth factor.

Soroori, S; Veshkini, A; Dehghan, MM; Farhadian, O. **Radiographic assessment of bone cortex to bone diameter ratio of manus and pes in camel.** *Iranian Journal of Veterinary Surgery*. 2007; 2(2): 7-12. Note: In English with a Persian summary.

Abstract: Objective - To measure statistically bone cortex to diameter (C/D) ratio in metocarpo/metatarsal and proximal phalanges in camel. This ratio may be used in diagnosing possible metabolic and nutritional diseases in camel. Design - Experimental study. Animals - Twelve camel limbs (6 fore limbs & 6 hind limbs). Procedures - This study was conducted on dorsopalmar/dorsoplantar radiographs of twelve fore and hind limbs of camel. Cortical thickness, bone diameter and C/D ratio of mid metacarpo/metatarsal regions, C/D ratio of metacarpo/metatarsal regions just proximal to its bifurcation and C/D ratio of proximal phalanges were measured on all radiographs. Available data were analyzed statistically and the average, P-values, and standard deviations are given. Important characteristic of measurements are discussed. Results - C/D ratios of mid metacarpal region and just proximal to its bifurcation were 0.18 and 0.13 respectively. C/D ratios of mid metatarsal region and just proximal to its bifurcation were 0.21 and 0.14 respectively. C/D ratios of mid lateral and medial proximal phalanx of forelimb were 0.21 and 0.22 respectively. C/D ratios of mid lateral and medial proximal phalanx of hind limb were 0.22 and 0.24 respectively. Conclusion and Clinical Relevance - This study showed that there were significant differences between C/D ratios of manus and pes measured in all locations except between metacarpal to metatarsal region just proximal to its bifurcation. No acceptable reason was found for this result so it can be attributed to measurement inaccuracy in this site. Reproduced with permission of CAB.

Descriptors: dromedary camels, bone formation, bone mineralization, bones, bone calcification, metacarpus, metatarsus, radiography.

von Engelhardt, W; Dycker, Ch; Lechner Doll, M. **Absorption of short-chain fatty acids, sodium and water from the forestomach of camels.** *Journal of Comparative physiology B. Biochemical Systemic and Environmental Physiology.* 2007 Aug; 177(6): 631-640. ISSN: 0174-1578

DOI: http://dx.doi.org/10.1007/s00360-007-0161-8

NAL call no: QP33.J681

Abstract: In camelids the ventral parts of compartments 1 and 2 (C1/C2) and the total surface of compartment 3 of the forestomach are lined with tubular glands, whereas in ruminants the surface of the forestomach is composed entirely of stratified, squamous epithelium. Thus, differences in absorption rates between these foregut fermenters can be expected. In five camels C1/C2 was temporarily isolated, washed and filled with buffer solutions. Absorption of short-chain fatty acids (SCFA) and net absorption of sodium and water were estimated relative to Cr-ethylenediaminetetraacetic acid as a fluid marker. SCFA were extensively absorbed in the forestomach; clearance rates of SCFA with different chain lengths were equal. After lowering the pH of solutions SCFA absorption rates increased, but much less than the increase of the non-ionized fraction. Absorption of propionate was lower when acetate had been added. Findings suggest that most of the SCFA in camels are transported in the ionized form, most likely via an anion exchange mechanism. Net water absorption is closely related to net sodium absorption. Apparently water absorption results from an isoosmotic process. Differences between absorption mechanisms of SCFA from the forestomach of camelids and ruminants are discussed.

Descriptors: camels, forestomach, absorption mechanisms, cellular structure, short chain fatty acids, net absorption of sodium and waster, Cr-ethylenediaminetetraacetic acid as fluid marker, ion exchange mechanism, comparison to ruminants.

Wise, John A; Harris, Roger C; Hill, Chester A. **Comparative and evolutionary adaptation of muscle buffering capacity in species subject to varying degrees of acidosis.** *FASEB Journal.* 2007; 21(6): A1399. ISSN: 0892-6638. Note: "Experimental Biology 2007 Annual Meeting, Washington, DC, USA; April 28 -May 02, 2007"

Abstract: The Histidine (His) dipeptides, Camosine (beta-AlaHis) Anserine (beta-Ala-1-methylHis) and Balenine (beta-Ala-3-methylHis) are ubiquitous in muscle of vertebrates and invertebrates. Their major function appears to be H+ buffering in muscle, with the imidizole ring of the His residue having a pka of 6.7-7.1. Species variations in the quantity of His-dipeptides appears to be proportional to the level of anerobically generated H+ ions during naturally encountered bouts of exercise. Whale muscle, which contains the highest level of His-dipeptide of any species (> 350 mmol.kg(-1)dm), is subjected to the greatest levels of anaerobic acidosis during prolonged oxygen deprivation. Pectoral muscle from birds such as wild pheasant (similar to 220) have evolved high levels to combat H+ ions generated by explosive flight, a requirement for survival, but also a vestigial feature in the chicken (similar to 225) and turkey (similar to 275). Horses (similar to 110), dogs (similar to 82) and racing camels (similar to 70) have selectively adapted higher muscle levels to counteract acute acidosis during sprints required for escape, hunting or racing. Humans, in contrast, have much lower levels; V lateralis in body builders (similar to 44), omnivores (similar to 23) and vegetarians (similar to 13) are consistent with less need for sprinting for survival, CONCLUSION: Comparative levels of His-dipeptide in muscle from different species are reflective of the relative need for H+ buffering indicating evolutionary adaptation.

Descriptors: racing camels, humans, turkeys, wild pheasant, chicken, horses, dogs, humans, species comparison, muscle buffering capacity, acute acidosis, anaerobic exercise, sprinting, hunting, racing. H+ buffering capacity.

Yadav, SBS; Bissa, UK; Pannu, U. **A review on body weight and draught power in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 207-214.

Abstract: Indian camels are mainly used for draught power in cultivation, transportation and other agricultural operations since its domestication and utilisation in India. It has always been a point of research and investigation whether the draught is associated with body weight and size. It is well known that draught power potential is a breed-associated characteristic. With in a given breed it has a direct relation with body weight through muscular strength of animals. The breeding programs for draught camels should be directed towards increasing growth rate, fertility and reproductive efficiency while maintaining milk and meat yield. The present review describes the result of studies on birth weight, adult body weight and the draught power. In the review it has been concluded that draught power is directly associated with adult body weight and the camels in India with average body weight of around 510 kg has got a work potential of 2.25 MJ per hour from an average of 485 Newton force equivalent to 0.84 British Horse Power.

Descriptors: dromedary camels, breeding for draft animals, animal pulling power, muscular strength, transport of things, agricultural operations, birth weight, adult body weight, draft animals, working animals, India.

Zeleke, ZM. **Non-genetic factors affecting milk yield and milk composition of traditionally managed camels (*Camelus dromedarius*) in Eastern Ethiopia.** *Livestock Research for Rural Development.* 2007; 19(6): 85. ISSN: 0121-3784

Abstract: The study was conducted to asses the effects of non-genetic factors on milk yield and milk composition of camels kept under traditional management conditions in eastern arid and semiarid areas of Ethiopia. The overall mean daily yield and composition of fat, protein, lactose and dry matter of milk were 3.75 litres, 2.47%, 2.67%, 4.67% and 10.44%, respectively. Stage of lactation, parity and season of the year had significant (P<0.01) effects on daily milk yield, composition of fat, protein and dry matter. The percentage composition of lactose remained unaffected by all variables considered. The highest average daily milk yield was recorded during the first 3 months of lactation (4.04+or-0.10 litres), whereas the least was after 9 months of lactation. There was no significant difference in daily milk yield until 9 months postpartum. The percentage compositions of fat and protein were also the highest during the first 3 months of lactation period (3.24+or-0.11 and 2.98+or-0.06, respectively). Similarly, the highest average daily milk yield and percentage composition of protein, fat and dry matter were recorded from camels of 3rd parity (5.43+or-0.19 litres, 5.32+or-0.44, 3.16+or-0.26 and 13.33+or-0.63, respectively). The least milk yield was obtained from camels of parity six. The highest daily milk yield (4.21+or-0.11 litres) was recorded during the wet season as compared to the dry season (3.54+or-0.10 litres). This study indicated that camels are reliable sources of milk in hostile regions of the country with persistent yield and composition throughout most periods of lactation. However, culling strategy of old dams (after parity five in this case) and provision of adequate feed and water during dry season would result in better productivity. Reproduced with permission of CAB.

Descriptors: dromedary camel milk, milk yields, milk composition, lactation stage; lactose levels, milk fat percentage, milk production, milk protein percentage, milk quality, parity, seasonal variations, wet season, dry matter, dry season, environmental factors, rainy season, Ethiopia, Abyssinia.

Zia ur Rahman; Ahmad, N.; Bukhari, SA; Akhtar, N; Haq, IU. **Serum hormonal, electrolytes and trace element profiles in the rutting and non-rutting one-humped male camel (*Camelus dromedarius*).** *Animal Reproduction Science.* 2007 Sept; 101(1-2): 172-178. ISSN: 0378-4320

DOI : http://dx.doi.org/10.1016/j.anireprosci.2006.11.008
NAL call no .: QP251.A5

Descriptors : dromedary camels, adult animals, hormone secretion, testosterone, progesterone, corticosterone, trace elements, electrolytes, blood serum, blood chemistry, epididymis, testes, normal values, seasonal variation, breeding season, courtship.

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Abdo Salem, S; Gerbier, G; Bonnet, P; Al Qadasi, M; Tran, A; Thiry E; Al Eryni, G; Roger, F. **Carbohydrases in camel (*Camelus dromedarius*) pancreas. Purification and characterization of glucoamylase.** *Annals of the New York Academy of Sciences*. 2006; 1081: 240-242. ISSN: 0077-8923. Note: "Impact of Emerging Zoonotic Diseases and Animal Health: 8th Biennial Conference of the Society for Tropical Veterinary Medicine, Hanoi, Vietnam, 26 June-1 July 2005."
Descriptors: dromedary camels, pancreas, carbohydrases, glucoamylase characterization, biochemistry.

Abdoon , AS; Kliem, H; Kandil, OM; Schams, D; Berisha, B. **Expression of steroid receptors in corpus luteum and endometrium during different stages of pregnancy in dromedary camel.** *Reproduction in Domestic Animals.* 2006; 41(4): 357. ISSN: 0936-6768. "10th Annual Conference of the European Society for Domestic Animal Reproduction, Portoroz, Slovenia; September 07-09, 2006."
NAL call No: SF105.A1Z8
Descriptors: dromedary camels, pregnant females, reproductive physiology, corpus luteum, endometrium, steroid receptors expression, messenger RNA, progesterone receptor, estradiol receptor alpha, varied expression related to stages of pregnancy.

Al Faraj, A; Al Haidary, A. **Measurement and simulation of camel core body temperature response to ambient temperature.** *International Journal of Agriculture and Biology*. 2006; 8(4): 531-534. ISSN: 1560-8530
URL: http://www.fspublishers.org/
Abstract: The objective of this study is to use a biotelemetry system for continuous measurement of camel core body temperature and to use a system identification technique to model and simulate the core body temperature response to diurnal changes in ambient temperature. Air and core body temperatures of five Arabian camels were recorded every thirty minutes over a six days period. During the course of this study, camels maintained their temperature near a constant level (36.5 degrees C+or-0.04). Deep body temperature response to ambient air temperature was modelled using a system identification technique. A linear difference equation (ARX model) was used to build a mathematical model from measured input (air temperature) and output (core body temperature). The parameters of the ARX model were estimated using the least squares method. Quality of the model was evaluated by simulation with input from a new data set. The model output was in good agreement with the measured one where the root mean square difference between measured and simulated output was 0.58 degrees C.
Descriptors: dromedary camels, air temperature, body temperature, environmental temperature, mathematical models, telemetry, temperature, thermoregulation, biotelemetry, heat regulation, radiotelemetry.

Al Hamidi, Abdulaziz A. **Characteristics and kinetics of kallikrein enzyme from Arabian camel pancreas.** *Saudi Journal of Biological Sciences.* 2006; 13(1): 50-57. ISSN: 1319-562X
Descriptors: dromedary camels, pancrease enzymes, kallikrein enzyme, characteristics, kinetics, heat labile, stable up to 45degrees C for 30 minutes, degraded above 50degrees C. to

78.5% at 70 degrees C., inhibiting substances, urea, phenylmethyl sulfonyl fluoride (PMSF), leupeptin, cations and aprotinin, enzyme activity optimum is ph10.0, stimulated by deoxycholate, Michalis - Menten constant Km and Vmax40.0 mu mole/min and 8.53 mu mole/min.

Al, RK; Bani Ismail, ZA; Al Zghoul, MB. **Cytologic analysis of synovial fluid in clinically normal tarsal joints of young camels (*Camelus dromedarius).*** *Veterinary Clinical Pathology*. 2006 Sept; 35(3): 326-328. ISSN: 0275-6382
NAL call no: SF601.A54
Descriptors: dromedary camels, young male animals, synovial fluid, tarsal joints, cell biology, animal proteins, protein content, lymphocytes, monocytes, macrophages, neutrophils, reference standards.

Al Rukibat, RK; Al Zghoul, MB; Ismail, ZAB. **Physical, biochemical and cytological analysis of synovial fluid of radiocarpal joint of clinically normal young camels (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2006; 13(2): 145-147. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The present study was carried out to determine the protein and cellular composition of synovial fluid in clinically normal radiocarpal joints in young camels (*C. dromedarius*). Bilateral arthrocentesis of the radiocarpal joints was performed and the synovial fluid's total nucleated cell counts, absolute and percentages of polymorphonuclear leukocytes, lymphocytes, monocytes/macrophages and total protein concentration were determined. The mean+or-SD and range of total nucleated cell counts were 80-2300 cells/micro l (600+or-500 cells/ micro l). Mononuclear leukocytes were the predominant cell type with lymphocytes at 0-90% (60+or-25 cells/ micro l). The total protein concentration ranged from 1-3 g/dl (2+or-1 g/dl). Statistically, there were no significant differences between the synovial fluid cellular and protein contents of right and left radiocarpal joints. These values are helpful in determining the health status of the radiocarpal joints in clinically lame animals. Reproduced with permission of CAB.
Descriptors: dromedary camels, biochemistry, carpus, radiocarpal joints, synovial fluid, chemical composition, cytology, white blood cells, leukocytes, proteins, lymphocytes, macrophages, monocytes.

Al Sobayil, FA. **Cerebrospinal fluid constituents in healthy female dromedary camels**. *Veterinary Medical Journal Giza.* 2006; 54(2): 231-243. ISSN: 1110-1423. Note: In English with an Arabic summary.
Abstract: The appropriate location for collecting cerebrospinal fluid (CSF) from the dromedary camel was described. The reference range of cytological and biochemical constituents of CSF was determined in 25 clinically normal adult camels and compared with the corresponding serum. Camel CSF was colourless with similar viscosity to water. The maximum normal counts of red blood cells (RBCs) and white blood cells (WBCs) were 141 and 9 cells/micro l, respectively. Significant differences in the values of total protein (TP), albumin, globulin, glucose, alkaline phosphatase (ALP), lactate dehydrogenase (LDH), creatine kinase (CK), glutamic pyruvic transaminase (GPT) and glutamic oxaloacetic transaminase (GOT) were observed between the CSF and serum. Moreover, a significant difference was observed

in the levels of calcium between the CSF and serum. Reproduced with permission of CAB.
Descriptors: dromedary camels, female camels, alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase, blood chemistry, blood protein, calcium, cerebrospinal fluid, color, creatine kinase, erythrocyte count, erythrocytes, globulins, lactate dehydrogenase, leukocyte count, leukocytes, serum albumin, viscosity, alkaline phosphomonoesterase, red blood cells, cell count, colorless CSF, creatine phosphokinase, glutamate pyruvate transaminase, glutamic pyruvic transaminase, GOT, GPT, leucocytes, plasma protein, red blood cells, serum protein, white blood cells.

Al Suwaigh, BR; Al Suhaimi, EA. **Comparative study on some biochemical constituents of plasma in both male camels and goats.** *Veterinary Medical Journal Giza.* 2006; 54(1): 171-178. ISSN: 1110-1423
Abstract: The study was performed to compare the plasma biochemical composition of camel and goat. Blood samples were collected from 36 camels and 14 goats, both at <=2 years. The concentration of glucose, total cholesterol (CH), triglycerides (TG), high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), total protein, aspartate transaminase (AST) and alanine transaminase (ALT) were measured. Results revealed that plasma glucose level of camels was significantly higher than goats ($P<0.01$). There were no significant differences in lipoprotein and total protein concentrations between the two animals. The activities of AST and ALT in camel were significantly lower ($P<0.001$) than goats. It is concluded that a significant positive correlation between glucose and cholesterol, and a significant negative correlation between both glucose and cholesterol and enzyme activities were observed.
Descriptors: dromedary camels, goats, alanine aminotransferase, aspartate aminotransferase, biochemistry, blood chemistry, blood sugar, cholesterol, enzyme activity, enzymes, high density lipoprotein, low density lipoprotein, species differences, triacylglycerols, very low density lipoprotein, blood glucose, glutamate-pyruvate transaminase, glutamic pyruvic transaminase, GOT GPT, total protein, triglycerides.

Aminlari, M; Vaseghi, T. **Biochemical properties and biological functions of the enzyme rhodanese in domestic animals.** *Iranian Journal of Veterinary Research.* 2006; 7(2(Ser.15)): 1-13. ISSN: 1728-1997. Note: In English with a Persian summary. A literature review.
Abstract: The enzyme rhodanese (thiosulfate: cyanide sulfurtransferase) is an ubiquitous enzyme and its activity is present in all living organisms. Many functions, including cyanide detoxification, formation of iron-sulfur centres and participation in energy metabolism, have been attributed to this enzyme. The enzyme catalyses the transfer of a sulfur atom from sulfane containing compounds (such as thiosulfate) to thiophilic anions (such as cyanide). The sulfhydryl group of cysteine-247 in the molecule of rhodanese participates in a double displacement of sulfur transfer mechanism. This review summarizes the latest information available on the molecular properties and pattern of distribution of rhodanese in different tissues of domestic animals and presents a plausible explanation of the biological function of this important enzyme in living organisms. Reproduced with permission of CAB.
Descriptors: dromedary camels, horses, sheep, cattle, dogs, donkeys, asses, animal tissues, cyanides, domestic animals, enzyme activity, metabolic detoxification, sulfur, thiosulfate

sulfurtransferase, tissue distribution, elemental sulphur, rhodanese, sulphur, thiosulphate sulphurtransferase.

Aminlari, M; Gholami, S; Parhizgari, G; Ranjbar, S. **Comparison of optic lens proteins among animals at different stages of development.** *Iranian Journal of Veterinary Research.* 2006; 7(1(Ser.14)): 1-7. ISSN: 1728-1997. Note: In English with a Persian summary.
Abstracts: The purpose of this investigation was to study and compare the electrophoretic patterns of optic lens proteins of different species of domestic animals at prenatal and postnatal ages. Optic lenses were obtained from the embryo or adult sheep, cattle, goat, camel and chicken at the slaughterhouse, homogenized and subjected to sodium dodecylsulfate polyacrylamide gel electrophoresis (SDS-PAGE). In all animals, except chicken, majority of proteins had molecular weights of <33 kDa and their concentrations were not affected by the age of animals. A 9 kDa protein which was present in adult sheep optic lens was absent in fetal sheep lenses at different age groups. Significant differences were observed in camel and chicken. In camels, proteins with molecular weights of 30 and 38 kDa were present, the concentration of which was much lower in other animals. A protein of 57 kDa which constituted the major protein of chicken optic lens was absent in other species of animals. The concentration of proteins in the range of 25-30 kDa increased with the age of chicken embryos. These proteins were remarkably different from those of adult chicken lens proteins except the 57 kDa protein which was also the predominant protein in the embryo. The 38 kDa protein disappeared and a 20 kDa protein appeared in the chicken embryo lens as compared with adult chicken lens. These data indicate extensive differences in the lens proteins of animals and suggest different physiological functions of lens proteins in different animals at different stages of development. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, sheep, poultry, chickens, age differences, embryos, eye lens, eyes, optic lens proteins, comparison study, species differences.

Bani Ismail, Z; Al Rukibat, R. **Synovial fluid cell counts and total protein concentration in clinically normal fetlock joints of young dromedarian camels.** *Journal of Veterinary Medicine—Zentralblatt fur Veterinarmedizin Reihe-A.* 2006 June; 53(5): 263-265. ISSN: 0931-184X
DOI: http://dx.doi.org/10.1111/j.1439-0442.2006.00823.x
NAL call no: 41.8 Z5
Abstract: Twenty-seven 9-12 months old healthy male dromedarian camels were used to determine total nucleated leucocyte count (TNCC), absolute and percentages of polymorphonuclear (PMN) and mononuclear leucocytes, and total protein (TP) concentration in synovial fluid from grossly and radiographically normal fetlock joints. Arthrocentesis was performed bilaterally from the fetlock joints of the forelimbs and hindlimbs. Blood contaminated samples and samples obtained from grossly or radiographically abnormal joints were excluded. The mean +/- SD of TNCC in 108 samples of fetlock joint synovial fluids was 500 +/- 400 cells/(So(Bl. Monocytes/macrophages were the predominant cell type. There were no significant differences in mean TNCC, absolute numbers and percentages of various leucocytes and TP concentrations between the right and left fetlock joints of the forelimbs and hindlimbs or between the fetlock joints of the forelimbs and hindlimbs. The mean +/- SD of absolute numbers and percentages of various cell types were: PMN leucocytes 1 +/- 2 cells/

(So(Bl (2%), lymphocytes 116 +/- 167 cells/(So(Bl (26%), and monocytes/macrophages 383 +/- 323 cells/(So(Bl (72%). The mean +/- SD of TP concentration was 2 +/- 1 g/dl.
Descriptors: camels, males, young camels, animal diseases, joint diseases, disease detection, disease diagnosis, camel fetlock joints, synovial fluid, forelimbs, normal values, blood cell counts, leukocyte count, radiography, blood chemistry, macrophages, monocytes, fetlock joint.

Bella, A; Sousa, NM; Dehimi, ML; Watts, J; Beckers, JF. **Western analyses of pregnancy-associated glycoprotein family (PAG) in placental extracts of various mammals.** *Theriogenology.* 2006 Oct 15; 68(7): 1055-1066. ISSN: 0093-691X
DOI : http://dx.doi.org/10.1016/j.theriogenology.2007.08.002
NAL call no: QP251.A1T5
Abstract: The present study was conducted in order to analyze the immunoreactivity of placental extracts of several animal species and humans against the following three groups of PAG antisera: anti-boPAG-I (R#497), -boPAG-II (R#435), and -caPAG (R#706). Placental proteins were obtained after extraction at neutral pH, followed by ammonium sulfate (A.S.) precipitation, dialysis, and lyophilization. The immunoreactivity of different placental extracts was revealed by the use of monodimensional SDS-PAGE, followed by blotting on nitrocellulose membrane and the identification of immunoreactive proteins after incubation with PAG antisera (Western blot technique). A strong immunoreactivity of proteins from synepitheliochorial placenta (cattle, sheep, goat, bison, buffalo, and deer) was demonstrated in both 20-50% and 50-80% A.S. fractions using the three antisera. Proteins from species with epitheliochorial placenta presented variable profiles of detected PAG-like proteins: in the sow, many immunoreactive forms were revealed by antisera boPAG-I and boPAG-II, whereas in the dromedary, only two forms were revealed by anti-boPAG-II. Concerning other species, our protocols showed for the first time a cross-reaction between PAG antisera with proteins extracted from dog, alpaca, dromedary, sea lion, and human placenta.
Descriptors: mammals, cattle, sheep, goats, bison, buffalo, deer, dromedary camels, alpaca, sea lion, humans, placenta, animal tissue extracts, glycoproteins, antiserum, immunochemistry, cross reaction,Western blotting, placental glycoproteins, immunoreactivity.

Ben Bacha, Abir; Frikha, Fakher; Djemal, Ikram; Fendri, Ahmed; Miled, Nabil; Gargouri, Youssef; Mejdoub, Hafedh**. Biochemical and structural comparative study between bird and mammal pancreatic colipases.** *Journal of Lipid Research JLR.* 2006 Dec; 47(12): 2701-2711. ISSN: 0022-2275
DOI: http://dx.doi.org/10.1194/jlr.M600242-JLR200
NAL call no: 381 J8282
Abstract: Three colipases were purified from pancreas of two birds (ostrich and turkey) and one mammal (dromedary). After acidic and/or heat treatment and precipitation by sulfate ammonium and then ethanol, cofactors were purified by Sephadex G-50 gel filtration followed by ion-exchange chromatography first on Mono S and then on Mono Q. One molecular form was obtained from each species with a molecular mass of ~10 kDa. Cofactors were not glycosylated. The N-terminal sequences of the three purified cofactors showed high sequence homology. A 90 amino acid sequence of the ostrich cofactor was established based on peptide sequences from four different digests of the denaturated protein using trypsin,

chymotrypsin, thermolysin, or staphylococcal protease. This sequence exhibited a high degree of homology with chicken and mammal cofactors. Bile salt-inhibited pancreatic lipases from five species were activated to variable extents by colipases from bird and mammal origins. The bird pancreatic lipase-colipase system appears to be functionally similar to homologous lipolytic systems from higher mammals. Our comparative study showed that mammal colipase presents a lower activation level toward bird lipases than the bird counterpart. Three-dimensional modeling of ostrich colipase suggested a structural explanation of this fact.
Descriptors: ostrich, turkey, camel, pancreas, enzyme analysis, colipases, lipase, isolation procedure, 3 dimensional modeling.

Ben Bacha, A; Gargouri, Y; Bezzine, S; Mejdoub, H. **Purification and biochemical characterization of phospholipase A2 from dromedary pancreas.** *Biochimica et Biophysica Acta, General Subjects.* 2006; 1760(8): 1202-1209. ISSN: 0304-4165
DOI: http://dx.doi.org/10.1016/j.bbagen.2006.03.014
Abstract: Dromedary pancreatic PLA2 (DrPLA2) was purified from delipidated pancreases. Pure protein was obtained after heat and acidic treatment (70 degrees C; pH 3.0), precipitation by ammonium sulphate and ethanol respectively, followed by sequential column chromatographies on Sephadex G-50, MonoS Sepharose, MonoQ Sepharose and C-8 reverse phase high pressure liquid chromatography. Purified DrPLA2, which is not glycosylated protein, was found to be monomeric protein with a molecular mass of 13748.55 Da. A specific activity of 600 U/mg for purified DrPLA2 was measured at optimal conditions (pH 8.0 and 37 degrees C) in the presence of 3 mM NaTDC and 7 mM CaCl< sub>2</ sub> using PC as substrate. The sequence of the first fourteen amino-acid residues at the N-terminal extremity of DrPLA2 was determined by automatic Edman degradation. One single sequence was obtained and shows a close similarity with all other known pancreatic secreted phospholipases A2.
Descriptors: dromedary camels, pancreas, phospholipaseA2, amino acid sequences, protein sequences, biochemistry, purification, phosphatidase.

Cebra, C K. **Camelid blood test interpretations.** *Large Animal Proceedings of the North American Veterinary Conference, Volume 20, Orlando, Florida, USA, 7-11 January, 2006.* 2006; 268-271.
Descriptors: dromedary camels, alpacas, blood testing, blood sampling, normal values, reference blood values, cell counts, biochemistry, hematology, 3 hydroxybutyric acid, alanine aminotransferase, aspartate aminotransferase, chloride, creatinine, disease markers, electrolytes, blood cells, eosinophils, erythrocytes, lymphocytes, leucocytes, leukocytes, blood platelets, thombocytes, fatty acids, glucose, dextrose, sodium. immunoglobulins, gammaglobulins, serum albumins, potassium, triacylglycerols.

Dharm Pradeep; Tiwari, GS. **Fatigue assessment of camel in transportation.** *Indian Veterinary Journal.* 2006; 83(9): 982-984. ISSN: 0019-6479
NAL call no.: 41.8 IN2
Abstract: Three Bikaneri camels of different age and weight groups were selected for an experiment to test fatigue during transportation. Camels were then operated on three draught and work rest cycles. Fatigue score were calculated on the basis of physiological responses and physical symptoms Maximum fatigue score was found in work rest cycle WR<

sub>1</ sub> (8 hours work and 5 hours rest) at similar condition of draught whereas it was minimum with work rest cycle WR< sub>3</ sub> (8 hours work and 6 hours rest) at similar condition of draught. Based on this results it may be concluded that the camels exhibited less fatigue symptoms with W< sub>3</ sub> at different draught and duration of work in transportation.
Descriptors: dromedary camels, Bikaneri breed, draft animals, maximum fatigue score, rest, stress, stress response, transport, cart and draft animals, working animals, fatigue cycles.

Di Rocco, Florencia; Parisi, Gustavo; Zambelli, Andres; Vida Rioja, Lidia. **Rapid evolution of cytochrome C oxidase subunit II in camelids (Tylopoda, Camelidae)**. *Journal of Bioenergetics and Biomembranes.* 2006; 38(5-6): 293-297. ISSN: 0145-479X
Abstract: Within cetartiodactyl species, both New and Old World camelids are uniquely adapted to the extremely hot and dry climates of African-Asian territories and to the high altitude cold and hypoxic environment of the whole Andean area. In order to investigate the potential association between these particular adaptations and mitochondrial aerobic energy production, we examined the camelid genes of cytochrome c oxidase subunits I, II, and III and the replacement of amino acids inferred. We found that all subunits had undergone a number of replacements in sites otherwise conserved in other cetartiodactyls. Changes of COXI and COXIII were mainly located in the transmembrane helices of proteins. For COXII, although most of the changes did not occur in sites directly involved in electron transfer, a shift of D by T at 115 position of Old World camelid might modify electrostatic interactions with cytochrome c. COXII also showed an increased relative evolutionary rate respect to other cetartiodactyls compared.
Descriptors: New and Old World camelids, adaptions to hot and dry climates, high altitude cold and hypoxic environments, mitochondrial aerobic energy production, cytochrome c Cxidase subunits I, II, and III, differences found.

El Hatmi, H; Levieux, A; Levieux, D. **Camel (*Camelus dromedarius*) immunoglobulin G, l-lactalbumin, serum albumin and lactoferrin in colostrum and milk during the early post partum period.** *Journal of Dairy Research*. 2006 Aug; 73(3): 288-293. ISSN: 0022-0299
DOI: http://dx.doi.org/10.1017/S0022029906001713
NAL: 44.8 J823
Abstract: Colostrum and milk samples from twelve Tunisian camels were analysed for concentration of immunoglobulin G (IgG), l-lactalbumin (l-la), serum albumin (CSA) and lactoferrin throughout the first 14 milkings post partum (7 days of lactation) using single radial immunodiffusion assay. Concentrations (mg/ml, meansplSD) at first milking were IgG, 100p”7pl60p”4; l-la, 2p”2pl0p”7; CSA, 8p”5pl3p”6 and lactoferrin, 1p”2pl0p”3. Large variations were recorded for IgG and CSA concentrations (11p”8-211p”1 mg/ml and 2p”9-13p”8 mg/ml respectively) Concentrations of IgG and CSA dropped abruptly in the subsequent milkings while l-la concentration increased until milking 5 and then decreased slowly. Lactoferrin dropped only from milking 7. Mean IgG concentrations were 3p”6 and 2p”5 mg/ml at milking 9 and 13 respectively. However, IgG concentration did not differ significantly, at the 1% level, from milkings 11 to 14. The contribution of CSA to the increase in whey proteins in early milks was greater than that described in the bovine and caprine species.

Descriptors; dromedaries, camel milk, immunoglobulin G, lactalbumin, serum albumin, lactoferrin, colostrum, postpartum period, temporal variation, whey protein, milk composition.

El Zeini, HM. **Microstructure, rheological and geometrical properties of fat globules of milk from different animal species.** *Polish Journal of Food and Nutrition Sciences*. 2006; 15(2): 147-153. ISSN: 1230-0322. Note: In English with a Polish summary.
Abstract: The variation between different Egyptian milk species (cows, buffaloes, sheep, goat and camel) in microstructure, shape, size and volume distribution as well as rheological properties, of fat globules was determined. Milk samples were scanned with SEM. The electron micrographs obtained were analyzed using an image analysis computer program. Results showed fat globules of different milk species as an oval shape in a regularity of spatial arrangement and encased in a lipoprotein membrane. Fat globules of different species vary considerably in diameter from those <1 micro m to ~18 micro m. Buffalo's globules were the greatest in size (8.7 micro m), whereas close size values were found between cow and sheep globules (3.78 and 3.76 micro m) as well as goat and camel globules (3.2 and 2.99 micro m). On the contrary, the size of buffalo fat globules ranging from 0.1-4.0 micro m was obviously less (23.0%) than that of camel (80.6%), goat (73.3%), cow (68.4%) and sheep (55.3%). Fat globules exhibited different patterns according to their sizes and milk type. Small globules, as in camel's milk, were less spherical than the large ones, as in buffalo's milk (at alpha =0.05). An inverse proportional relationship (r=-0.8) was found between spherical diameter and compactness. Most of the fat globules in buffalo's, cow's and goat's milks oriented with obtuse angle, while those for sheep's and camel's milks oriented with acute angles. Changes in distribution of fat globules volume, perimeter, surface area, width and length were similar to that of size and significantly ($p<0.001$) affected by milk species.
Descriptors: buffalo milk, camel milk, ewe milk, goat milk, fat globules, milk fat globule membrane; physical properties, rheological properties, Egypt.

Engelhardt, W von; Haarmeyer, P; Kaske, M; Lechner Doll, M. **Chewing activities and oesophageal motility during feed intake, rumination and eructation in camels.** *Journal of Comparative Physiology B Biochemical Systemic and Environmental Physiology.* 2006 Feb; 176(2): 117-124. ISSN: 0174-1578
DOI: http://dx.doi.org/10.1007/s00360-005-0027-x
Abstract : It was the aim of this study to characterize rumination behaviour, eructation and oesophageal motility in camels to identify similarities and differences between camels and domestic ruminants. Recordings were carried out in five camels fed on a hay-based diet. On an average, the duration of rumination, feeding and resting was 8.3, 5.6 and 10.1 h per 24 h, respectively. Rumination activity peaked in the morning between 9:00 and 11:00 and in the night between 02:00 and 04:00 a.m. During rumination periods, on an average 67 boluses were regurgitated per hour. Each bolus was chewed for an average of 45 s with 68 chews per min. The pause between two rumination cycles lasted on an average 9 s. Hay intake took 61 min/kg dry matter (DM), rumination lasted 71 min/kg DM of hay consumed. The regurgitation of a bolus started with a contraction of cranial compartment 1 (C 1) during a B-sequence, followed by a deep inspiration with closed glottis. Digesta enters the oesophagus, and an antiperistaltic wave transported the bolus orally. Eructation starts with a contrac-

tion of the caudal C1 during a B-sequence when the cranial C1 is relaxed. After entering the oesophagus, a rapid antiperistaltic wave transports the gas orally. Results revealed that the parameter values obtained in the camels were remarkably similar to those in domestic ruminants despite profound morphological differences and different patterns of forestomach motility.
Descriptors: camels, mastication, esophagus, forestomach, gastrointestinal motility, feed intake, hay, rumination, duration, diurnal variation, digestive physiology, chewing behavior, esophageal, motility, bolus regurgitation, antiperistalsis.

Genst, E de; Saerens, D; Muyldermans, S; Conrath, K. **Antibody repertoire development in camelids.** *Developmental and Comparative Immunology.* 2006; 30(1/2): 187-198. ISSN: 0145-305X
Abstract: The humoral immune response of the Camelidae is unique as these animals are the only known mammals that seem to possess functional homodimeric heavy-chain antibodies besides the classical heteromeric antibodies composed of heavy (H) and light (L) chains. By definition, the heavy-chain antibodies lack the L-chain, and it was noticed that their H-chain is devoid of the typical first constant domain (CH1) and contains a dedicated variable domain, referred to as VHH. The VHH exon is assembled from separate V-D-J gene segments. The recombined VHH region is subjected to somatic hypermutations; however, the timing and actual mechanism of the class switch from mu to the dedicated gamma -isotype remains elusive. Interestingly, antigen-specific VHHs are easily retrieved after panning of a phage-displayed rearranged V-gene pool cloned from an immunised camelid. These single-domain antigen binding entities possess a number of biophysical properties that offer particular advantages in various medical and biotechnological applications.
Descriptors: dromedary camels, camelids, antibodies, B lymphocytes, blood chemistry, complementary DNA, genes, hematology, humoral immunity, immune response, immunoglobulin, structural genes, lymphocytes, molecular conformation of antibodies, neutrophils, nucleotide sequences, immunological reactions.

Gorakh Mal; Sena, DS; Sahani, MS. **Milk production potential and keeping quality of camel milk.** *Journal of Camel Practice and Research.* 2006; 13(2): 175-178. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: Daily milk production in 5 lactating camels each of Bikaneri, Jaisalmeri and Kachchhi breeds belonging to first, second and third parity was studied. Milk yield was recorded daily at 12-h intervals by 2 different milking techniques, viz. 4-teat stripping and 2-teat stripping of one side and allowing the calf to suckle the other 2 teats. The average daily milk production by 4-teat and 2-teat stripping were 2.80+or-0.17 and 3.98+or-0.32 litres/day in Bikaneri, 2.60+or-0.17 and 3.90+or-0.34 litres/day in Jaisalmeri and 3.04+or-0.17 and 4.12+or-0.35 litres/day in Kachchhi, respectively. The effect of breed was significant ($P<0.05$) for total milk production in 4-teat stripping. The effect of parity was also significant ($P<0.01$) for total production under both the milking techniques. The month-wise daily milk production under both the techniques indicated significant ($P<0.01$) variation. Keeping quality was studied in 50 fresh camel milk samples comprising of pure and milk diluted with water (1:1) kept at room temperature (29+or-3 degrees C); pure and diluted (1:1) milk stored at 4 degrees C. The parameters studied at 2 h intervals were acidity, clot on boiling

(COB) test, alcohol test, alizarin-alcohol test and pH. The study indicated that pure and diluted (1:1) milk at room temperature could be stored for 8 and 10 h, respectively, while pure and diluted (1:1) milk at 4 degrees C can be stored for 20 and 28 days, respectively.
Descriptors: dromedary camels, breed differences, camel milk, keeping quality, milk production, milk quality, milk yield, milking, storage, storage life, temperature.

Ismail, IM; Mourad, M; Abdelsalam, AZE; Bedier, NZ. **Protein polymorphism of some camel breeds in Egypt.** *Journal of Camel Practice and Research.* 2006; 13(2): 103-109. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: Sixty-one camels of approximately the same age group belonging to Fallahy, Magrabi, Sudany and Mowaled breeds were used to measure variations in their plasma protein electrophoretic banding patterns by native gel electrophoresis. The electrophoretic patterns between and within the 4 camel breeds revealed the presence of 7 different fractions, viz. immunoglobulin, post transferring, alpha -globulin, transferrin, beta -globulin, albumin and post-albumin. Specific protein markers for males and females within each breed as well as between camel breeds were observed. Some pairs of breeds were also genetically characterized by specific protein markers, viz. Mowaled and Falahi, Sudany and Falahi and Sudany and Maghraby, which reflected a relationship between intra-paired breeds. Homogeneity ratios were 10.0, 16.7, 31.6 and 20.8% for Maghraby, Sudany, Falahy and Mowaled, respectively. Genetic similarity estimates varied between 0.81-0.88, 0.78-0.92 and 0.66-0.78 for intra-breed males, intra-breed females and as camel breeds, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camels, blood plasma proteins, breed differences, electrophoresis, genetic polymorphism, genetic variation,genotype variations, gamma globulins, immunoglobulins, serum albumin, transferring, Egypt.

Kacskovics, I; Mayer, B; Kis, Z; Frenyo, LV; Zhao YaoFeng; Muyldermans, S; Hammarstrom, L. **Cloning and characterization of the dromedary (*Camelus dromedarius*) neonatal Fc receptor (drFcRn).** *Developmental and Comparative Immunology.* 2006; 30(12): 1203-1215. ISSN: 0145-305X
DOI: http://dx.doi.org/10.1016/j.dci.2006.02.006
Abstract: The full length cDNA of the dromedary neonatal Fc receptor (drFcRn) alpha chain was isolated and found that it is similar to the neonatal Fc receptor (FcRn) of other species with a high overall similarity to ruminant FcRn alpha chains. The drFcRn/Fc contact residues are highly conserved and predicted to bind both conventional (IgG1) and heavy chain (IgG2a, IgG3) antibodies. Using immunohistochemistry, we detected its expression in the hepatocytes and in epithelial cells of portal bile ductuli and also in the mammary gland acini and ducti. Remarkably, Ser313, that was identified to be crucial for apical to basolateral transcytosis, is substituted in the drFcRn alpha chain. The full length of the dog and orangutan FcRn alpha chains was also identified from databases. Analyzing the phylogenetic relatedness of this gene we found that dromedary clustered together with artiodactyls, dog is located between artiodactyls and primates, where the orangutan was branched, reflecting the accepted evolutionary relationships. Reproduced with permission of CAB.
Descriptors: dromedary camels, dogs,antibodies, complementary DNA, IgG, liver cells,

immunohistochemistry, mammary glands, phylogenetics, cDNA, epithelial cells, Fc receptors, hepatocytes.

Kamili, A; Bengoumi, M; Faye, B. **Assessment of body condition and body composition in camel by barymetric measurements.** *Journal of Camel Practice and Research.* 2006; 13(1): 67-72. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: This study was conducted to assess the liveweight, carcass weight and importance of fat storage in camel by barymetric measurement before and after slaughter. A total of 61 camels aged between 6 months and 15 years were measured at the abattoir of Dakhla in south of Morocco. The barymetric measures were achieved before slaughter. After the death of the animals, the hump volume was estimated using the Archimedes' principle. The hump length and height were good indicators of the carcass weight (r=0.73 and r=0.78, respectively) and liveweight (r=0.54 and r=0.53, respectively). Neck perimeter and thigh perimeter were good predictors of the carcass weight. The liveweight and carcass weight could be assessed by the following equations: (i) carcass weight (kg)=1.21 x (hump height (cm) + neck perimeter (cm) - 17.49); (ii) liveweight (kg)=4.06 x age (year) + 3.05 x neck perimeter (cm) + 3.38 x thigh perimeter (cm) + 1.38 x hump length (cm) - 191; with 86 and 94% of the explained variance, respectively. Hump volume, length and height of the hump were good indicators of the adiposity of the camel (correlation coefficients of 0.80, 0.70 and 0.60, respectively) with the total fat storage. The hump represented 80% of the fat stored, whereas the fat around the kidney and mesentery represented 15 and 5%, respectively. The multivariate analysis allowed the identification of 3 types of body condition (live measures) and body composition (postmortem measures). Reproduced with permission of CAB.
Descriptors: dromedary camels, body composition, body condition, body fat, carcass weight, kidneys, liveweight, mesentery, morphometrics, neck.

Karray, Nadia Laadhar; Danthine, Sabine; Blecker, Christophe; Attia, Hamadi. **Contribution to the study of camel milk fat globule membrane**. *International Journal of Food Sciences and Nutrition.* 2006; 57(5-6): 382-390. ISSN: 0963-7486
Descriptors: camels, camel milk, fat globule membrane characterization, film balance, physiochemical composition, protein content, neutral lipids, phospholipids, mechanical properties, air-water interface, thermal study, high-melting triacylglycerols, long chain containg fatty acids.

Kataria, N; Kataria, AK. **Plasma levels of gastrin and pepsinogen in camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2006; 13(2): 141-144. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: Plasma gastrin and pepsinogen estimations were made in healthy camels and camels infected with *Haemonchus*, drought affected camels, and camels with pica. The overall mean values of plasma gastrin and pepsinogen in healthy camels were 101.15+or-10.41 pg/ml and 151.61+or-14.17 mU tyrosine, respectively. In the affected camels, a significant (P <=0.05) increase was observed in the mean values of both parameters when compared with those of healthy stock. The highest values of both parameters were observed in pica affected dromedaries. The sampling time also did not affect the gastrin and pepsinogen levels. Repro-

duced with permission of CAB.
Descriptors: dromedary camels, blood chemistry, drought, gastrin, pepsinogen, pica, *Haemonchus*, *Secernentea*, *Strongylida*.

Kataria, N; Kataria, AK. **Serum C-terminal parathyroid hormone levels in dromedaries.** *Journal of Camel Practice and Research.* 2006; 13(1): 37-39. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The serum C-terminal parathyroid hormone (C-PTH) levels were determined by RIA technique in healthy and drought-affected adult dromedaries (n=36) of either sex in an arid region. The calcium and phosphorus levels were also studied. The mean values (ng/ml) of C-PTH in healthy males, non-pregnant females and pregnant females were 1.81+or-0.03, 1.90+or-0.05 and 2.10+or-0.02, respectively, which were significantly (p< =0.05) lower than that in the respective subgroups of drought-affected animals. Overall mean values of serum calcium and phosphorus were insignificantly (p>0.05) and significantly (p<=0.05) lower, respectively, in drought-affected group than in healthy group. Reproduced with permission of CAB.
Descriptors: dromedary camels, calcium, healthy animals, drought-affected animals, mineral metabolism, parathyrin, phosphorus, parathyroid hormone.

Kuria, SG; Wahome, RG; Wanyoike, MM; Gachuiri, CK. **Effect of mineral supplement on plasma minerals concentration of camels (*Camelus dromedarius*) in Kenya.** *International Journal of Agriculture and Biology.* 2006; 8(2): 168-171. ISSN: 1560-8530
Abstract: A study was conducted in Ngurunit and Kargi locations of Marsabit district, Kenya to determine the effect of mineral supplementation on plasma minerals concentration of camels. Two mineral supplements were formulated; one comprising of locally collected, ground bones mixed with locally available natural salt and the other consisted of commercial ingredients. Fifty-nine camels in early lactation were recruited in Kargi and 56 in Ngurunit. Of these camels, 22 were randomly assigned commercial supplement in each site while 12 were put on local supplement in Kargi and 11 in Ngurunit. There were 25 control camels in Kargi and 23 in Ngurunit. Each dam was fed 200 g of supplement daily for 190 days, with blood samples being taken once a month for minerals assay. While the concentration of cobalt and copper was relatively stable, potassium, magnesium and iron exhibited a slight increase. Trends for calcium, sodium, zinc and phosphorus were inconsistent. These results suggested interactions, and that plasma minerals concentration is not a good indicator of dietary mineral content. Reproduced with permission of CAB.
Descriptors: dromedary camels, nutrition physiology, diatary mineral supplements, assays, calcium, cobalt, copper, sodium, magnesium, potassium, zinc, Kenya.

Kuria, SG; Gachuiri, CK; Wahome, RG; Wanyoike, MM. **Mineral profile in the plasma of free ranging camels (*Camelus dromedarius*) in Kenya.** *Indian Journal of Animal Sciences.* 2006; 76(12): 1068-1070. ISSN: 0367-8318
Abstract: The levels of important macro and trace minerals were assessed in the plasma of lactating camels kept by pastoralists in Kenya. A total of 90 and 88 camels were sampled during the dry and wet seasons, respectively. The average plasma Ca and Na concentrations were below the reported range, whereas the mean concentrations of K, P, Fe, Zn and Co were

within the limits established. The Mg concentration was above the reported range. Plasma concentrations of Ca, K, Na and Zn decreased from dry to wet seasons, whereas that of Mg, P and Co increased. Plasma Fe and Co were the same in both seasons. Other factors that might affect the plasma concentrations of these minerals were also assessed. Reproduced with permission of CAB.
Descriptors: dromedary camels, free range husbandry, micro elements, season changes, trace elements, iron, magnesium, phosphorus, potassium, calcium, cobalt, sodium, zinc, Kenya.

Mensah-Brown, EPK; Garey, LJ. **The superior colliculus of the camel: a neuronal-specific nuclear protein (NeuN) and neuropeptide study.** *Journal of Anatomy* . 2006; 208(2): 239-250. ISSN: 0021-8782
DOI: http://dx.doi.org/10.1111/j.1469-7580.2006.00517.x
Abstract: In this study we examined the superior colliculus of the midbrain of the one-humped (dromedary) camel, *Camelus dromedarius*, using Nissl staining and anti-neuronal-specific nuclear protein (NeuN) immunohistochemistry for total neuronal population as well as for the enkephalins, somatostatin (SOM) and substance P (SP). It was found that, unlike in most mammals, the superior colliculus is much larger than the inferior colliculus. The superior colliculus is concerned with visual reflexes and the co-ordination of head, neck and eye movements, which are certainly of importance to this animal with large eyes, head and neck, and apparently good vision. The basic neuronal architecture and lamination of the superior colliculus are similar to that in other mammals. However, we describe for the first time an unusually large content of neurons in the superior colliculus with strong immunoreactivity for met-enkephalin, an endogenous opioid. We classified the majority of these neurons as small (perimeters of 40-50 micro m), and localized diffusely throughout the superficial grey and stratum opticum. In addition, large pyramidal-like neurons with perimeters of 100 micro m and above were present in the intermediate grey layer. Large unipolar cells were located immediately dorsal to the deep grey layer. By contrast, small neurons (perimeters of 40-50 micro m) immunopositive to SOM and SP were located exclusively in the superficial grey layer. We propose that this system may be associated with a pain-inhibiting pathway that has been described from the periaqueductal grey matter, juxtaposing the deep layers of the superior colliculus, to the lower brainstem and spinal cord. Such pain inhibition could be important in relation to the camel's life in the harsh environment of its native deserts, often living in very high temperatures with no shade and a diet consisting largely of thorny branches.
Descriptors: dromedary camels, camel anatomy, brains, cell ultrastructure, enkephalins, immunohistochemistry, morphology, neurons, neuropeptides, somatostatin, body components, cerebrum, encephalins, immunoreactive cells, nerve cells, neurons, nuclear protein.

Mohamed, HE. **Factors affecting plasma contents of thiamine and ascorbic acid in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(4): 313-314. ISSN: 1680-5593
Abstract: This study was designed to investigate the effect of age, breed, sex and breeding season on thiamine and ascorbic acid status (AA) in camels (*Camelus dromedarius*). A total of 375 camels were sampled over a one-year field survey in Butana area, Central Sudan. No effect of sex on thiamine and ascorbic acid levels was observed. The breeding male and

female camels showed a higher status of plasma thiamine and lower ascorbic acid compared to non-breeding camels. Thiamine plasma contents showed variation with respect to age. The thiamine plasma levels for neonate, yearling and adult camels were 59.9+or-4.4, 70.5+or-8.9 and 88.9+or-6.7 micro g/litre, respectively. The corresponding figures for ascorbic acid were 6.2+or-1.0, 4.9+or-0.9, and 4.5+or-0.8 mg/litre, respectively. The Arabi showed a higher ascorbic acid (5.9+or-1.0) than Anafi (4.2+or-0.9 mg/litre). However, an insignificant breed variation for thiamine status was observed. Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, vitamin C, ascorbic acid, breeding season, aneurin, thiamine, vitamin B1, Sudan.

Mohamed, HE. **Purine derivatives in the plasma and urine and tissue xanthine oxidase (XO) in Sudanese camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(4): 310-312. ISSN: 1680-5593
Abstract: This study was conducted to examine the urinary and plasma purine derivatives in camels subjected to different feeding protocols. The xanthine oxidase activity in plasma, liver and intestine was assessed in relation to breed. Breed-related differences in tissue xanthine were observed. Arabi camels had higher values compared to Anafi camels. Xanthine oxidase activities in Arabi plasma, liver and intestine were 0.9+or-0.1 unit/litre, 0.18+or-0.09 unit/g wet tissue and 0.10+or-0.03 unit/g wet mucosa cell, respectively. In Anafi, the values were 0.4+or-0.09 unit/litre, 0.06+or-0.01 unit/g wet tissue and 0.09+or-0.02 unit/g wet mucosa cell, respectively. The total urinary purine derivatives as a function of feed intake were 11.43 and 15.09 mmol/day. Allantoin and uric acid were 75.6 and 15.4% of the total purine derivatives in both fed and fasted camels, but hypoxanthine plus xanthine was 9%. Reproduced with permission of CAB.
Descriptors: dromedary camels, intestines, liver, urine, uric acid, allantoin, purine bases, animal tissues, blood plasma, breed differences, enzyme activity, hypoxanthine intestines, purines, xanthine, xanthine oxidase, Sudan.

Mohamed, HE. **Factors affecting cortisol status in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(4): 307-309. ISSN: 1680-5593
Abstract: The objective of this study was to evaluate the concentrations of cortisol in peripheral circulation around parturition and weaning in camels (*Camelus dromedarius*). 10 pregnant Arabi camels aged 8.5 years and at 12 months of pregnancy were kept in shaded areas throughout the experimental period (45 days). Sampling intervals were one week before parturition, parturition, and one, 3 and 5 days post-parturition. No effect of sex on cortisol plasma level was observed. Cortisol level was 121.6+or-5.4 ng/ml at the day of parturition, but it decreased to 30.1+or-1.9 and 21.9+or-1.0 ng/ml at days 3 and 5 post-parturition, respectively. Cortisol serum level was 37.1+or-1.4 ng/ml one day before weaning and then increased to 48.0+or-1.5 and 69.5+or-1.9 ng/ml at weaning and 3rd day after weaning, respectively. The results showed that following weaning and around parturition, the cortisol status increased, which was regarded as an adaptive measure to harsh desert conditions. Reproduced with permission of CAB.
Descriptors: dromedary camels, young animals, weaning stress, stress response, cortisol, adaptation, hydrocortisone.

Mohamed, HE. **The influence of different dietary levels of copper on copper status, cholesterol and milk profile in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(4): 304-306. ISSN: 1680-5593

Abstract: This study was undertaken to determine the effects of dietary copper (Cu) on copper status and lipid metabolism in camels (*Camelus dromedarius*). Six primiparous and eleven multiparous camels were used in this investigation. Camels were randomly assigned to one of three treatments: control (no Cu supplementation); 15 mg of Cu/kg of DM from copper sulfate (CuSO4); and 45 mg Cu/kg of dry matter (DM). Plasma Cu concentrations were similar across all treatments. The total plasma cholesterol concentrations were higher in she camels supplemented with Cu at the end of the 2-month period. Camels that received 45 mg Cu/kg DM had higher plasma cholesterol than those that received 15 mg Cu/kg DM. No effect of treatment on DM intake, mean milk production, milk lipid and protein was observed. The results suggested that Cu supplementation changed the lipid metabolism in dairy camels. Reproduced with permission of CAB.

Descriptors: dromedary camels, cholesterol, copper, copper sulfate, dry matter, feed supplements, lipid metabolism, milk composition, milk production, milk-protein, fat metabolism.

Mohamed, HE. **Factors affecting the plasma contents of retinol and alpha tocopherol in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(4): 301-303. ISSN: 1680-5593

Abstract: The purpose of this study was to investigate the normal baseline levels of retinol and alpha-tocopherol in clinically healthy camels (*Camelus dromedarius)* kept under natural grazing conditions. A total of 275 Arabi camels of both sexes were sampled over a one-year field survey at Butana area, central Sudan. The overall mean concentrations of retinol and alpha-tocopherol were 479.5+or-69.4 ng/litre and 2.1+or-0.4 mg/litre, respectively. Sex showed an insignificant effect on vitamin levels. However, the season exerted a significant effect on the vitamin levels. The highest levels of retinol (493.5+or-80.3 ng/litre) and alpha-tocopherol (2.3+or-0.5 mg/litre) were observed during the rainy season (July to October). The corresponding values during the dry season (January to May) were 400.3+or-70.0 ng/litre and 1.4+or-0.4 mg/litre, respectively. Age influenced the vitamin levels, with adults having a higher status. Reproduced with permission from CAB.

Descriptors: dromedary camels, age differences, alpha tocopherol, blood plasma, retinol, seasonality, axerophthol, vitamin A, vitamin A alcohol, vitamin A1, Sudan.

Mohamed, HE. **Status of Fe, total binding capacity (TIBC) and transferring saturation in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(1): 3-4. ISSN: 1680-5593

Abstract: The present study was designed to establish reference values for blood concentrations of iron (Fe), total iron binding capacity (TIBC) and transferring saturation % in camels (*Camelus dromedarius*). A total of 375 camels of different age groups and sexes were used in this trial. The study indicated that sex did not have a discernable effect on Fe, TIBC and saturation %. Age was a significant variable for Fe and TIBC, but saturation did not differ. Reference ranges for Fe serum concentration, TIBC and transferring saturation were 166+or-24.8 micro g/dL, 361+or-30.5 and 56.3%, respectively. Reproduced with permission of CAB.

Descriptors: dromedary camels, age differences, blood reference values, normal values, transferrin, blood chemistry, iron, iron binding capacity.

Mohamed, HE. **The plasma folate and vitamin B12 contents in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(1): 1-2. ISSN: 1680-5593
Abstract: The aim of this study was to establish a reference range for folate and vitamin B12 plasma levels in camels (*Camelus dromedarius*). No effect of sex on folate and vitamin B12 were observed. Folate levels were 9.9+or-1.9 and 8.3+or-1.4 micro mol/litre and B12 levels were 169+or-11.8 and 173+or-12.4 pmol/litre for male and females, respectively. As for age, adult camels have significantly higher folate (9.4+or-1.19 micro mol/litre) and B12 (182+or-13.8 pmol/litre) than yearling (8.7+or-2.02 micro mol/litre and 174+or-9.11) and neonate (6.8+or-1.00 micro mol/litre and 166+or-10.9 pmol/litre). Physiological status showed insignificant effect on folate and B12 plasma levels. Folate plasma levels in non-pregnant, pregnant and lactating were 7.9+or-1.4, 8.2+or-1.99 and 8.9+or-2.01 micro mol/litre, respectively. However, the corresponding levels for B12 were 177+or-16.7, 182+or-13.8 and 185+or-12.1 pmol/litre, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, gestation, blood chemistry, blood plasma, cyanocobalamin, folic acid, lactation stage, normal values, pregnancy, vitamin B12, cobalamin, folacin, folate.

Mousa, HM; Omer, OH; Ali, BH; Al Wabel, N; Ahmed, SM. **Antioxidant levels in tissues of young and adult camels (*Camelus dromedarius*).** *Journal of Physiology and Biochemistry.* 2006; 62(3): 213-218. ISSN: 1138-7548. Note: In English with a Spanish summary.
Abstract: In this study, we measured the concentration of some antioxidant substances in erythrocytes hemolysate, liver, kidney and brain in young and adult camels. It has been found that the activity of the antioxidant enzymes glutathione peroxidase (GSH-Px), catalase (CAT), superoxide dismutase (SOD) and the concentration of glutathione, ascorbic acid and alpha -tocopherol are high in both young and adult camels. GSH-Px and CAT activities were higher in adult camels than in the young whereas no significant difference in the activity of SOD between young and adult camels was noticed. Glutathione was present in all tissues studied. Ascorbic acid was found to have significantly higher values in young camels. From this study it could be concluded that, as in other mammals, camel tissues contain a powerful antioxidant system. The liver has the highest contents of antioxidants and antioxidant enzymes indicating that it plays an important role in pro-oxidants detoxification. Age has a variable effect on the antioxidant system in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, alpha tocopherol, antioxidants, vitamin C, ascorbic acid, liver, kidneys, cerebrum, brain, catalase, enzyme activity, enzymes, erythrocytes, glutathione, glutathione peroxidase, superoxide dismutase, tissue distribution, red blood cells, cerebrum.

Raji, AR. **Histological study of lung parenchyma of the one-humped camel (*Camelus dromedarius*).** *Journal of Applied Animal Research*. 2006; 30(1): 37-40. ISSN: 0971-2119. Note: In English with a Hindi summary.
Abstract: The histology of lung parenchyma of camel (*Camelus dromedarius*, n=7) was studied using light microscopy. Intrapulmonary bronchi in the lungs of camel were lined by

a respiratory epithelium. The tela submucosa of bronchi of camel was loose connective tissue with many elastic fibres, smooth muscle and cartilage. No cartilage and gland were present in the bronchioles. Respiratory bronchioles were absent. Pores of kohn were found in the alveolar wall. The visceral pleura completely covered both lungs. It consisted of squamous mesothelial cells with varying amounts of elastic fibres and dense irregular connective tissue.
Descriptors: dromedary camels, muscle fibers, bronchi, cartilage, connective tissue, epithelium, histology, lungs, muscle fiber.

Rashed, R; Shinozaki, A; Imagawa, T; Uehara, M. **Morphologic characterisation of the inferior olivary complex in the camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2006; 13(2): 117-122. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The morphological structure of the inferior olivary complex in the brain stem of the camel (*C. dromedarius*) was investigated. Serial sections through the whole rostro-caudal extent of the inferior olivary complex confirmed the configuration and interrelations of each compartment. The brain stems from 5 fetuses of 600-800 mm crown-to-rump length (CRL) and a newborn camel were removed, fixed in 10% formalin for 3 weeks, dehydrated and embedded in paraffin (2 cases) or/and celloidin (4 cases). The cytoarchitecture of inferior olivary complex was mapped in transverse serial sections and stained with toluidine blue or/and crystal violet. A descriptive nomenclature was adapted to a terminology that would imply analogy with other species. The inferior olivary complex in the camel consisted of 3 major nuclei and 4 small cell groups. The medial accessory olivary nucleus was the largest among the major nuclei; with its caudal half had a unique sickle-shaped configuration. In general, the inferior olivary complex in the camel showed a phyletic homology with other mammals, i.e. the inferior olivary complex in the camel resembles that of other mammals very much, as well in its principal lines and in many other details. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel anatomy, fetus, neonates, brain stem, morphology.

Saber, AS; Erasha, AM. **Morphological and scanning electron microscopical studies of the nail of the camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2006; 13(2): 111-116. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: Fifteen pair of camel nails from thoracic and pelvic limbs were collected from a Cairo slaughterhouse and preserved, some in formalin and the others in glutaraldehyde, and were prepared by routine methods for scanning electron microscopical examination. The morphology of the nail and the structure of the epidermal lamellae and its corresponding corial one (arrangement, branching, direction and number) were described and discussed with other animal species. Of interest is the similarity of the camel's nail with that of man, apes and monkeys in the presence of light, crescent area, the lunule and at the base of the nail. At the same time, it was similar in structure to the epidermal capsule of the hooves and claws of ungulates. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel anatomy, hooves, hoof nails, morphology, scanning electron microscopy, structure, Egypt.

Saeed, A; Hussain, MM. **Influence of age and sex on various serum enzyme activities of camels.** *Journal of Camel Practice and Research.* 2006; 13(2): 149-155. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The activities of various diagnostic enzymes, viz. butyrylcholine esterase (ButChE), alpha -amylase (alpha Amyl), aspartate aminotransferase (AST), alanine aminotransferase (ALT), lactate dehydrogenase (LDH), creatine kinase (CK), gamma-glutamyltransferase (GGT) and alkaline phosphatase (ALP) were determined in the serum of 238 healthy camels of both sexes and different ages. The results were analysed with respect to sex and age. The mean activities of ButChE, alpha Amyl, AST, ALT, LDH, CK, GGT and ALP were 111.0+or-23.9 and 112.6+or-28.0, 1404+or-160.2 and 1366.8+or-137.8, 87.4+or-13.1 and 85.6+or-11.5, 11.2+or-2.3 and 11.4+or-2.3, 776.5+or-91.9 and 767.1+or-102.2, 87.6+or-31.4 and 73.1+or-27.2, 12.1+or-4.0 and 11.6+or-3.6 and 305.2+or-111.9 and 268.4+or-91.2 U/litre in male and female camels, respectively. Analysis of data revealed that CK and ALP activities in the serum of males were significantly higher than females. Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, alanine aminotransferase, alkaline phosphatase, alpha amylase, aspartate aminotransferase, blood chemistry, cholinesterase, creatine kinase, enzyme activity, gamma glutamyltransferase, lactate dehydrogenase, normal values, sex differences, alkaline phosphomonoesterase, creatine phosphokinase, glutamate pyruvate, transaminase, glutamic pyruvic transaminase, glutamyl transferase, GOT, GPT.

Saleh, AM. **Morphological and immunohistochemical study of the non-ampullated part of the ductus deferens of the camel (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal.* 2006; 52(111): 19-35. Note: In English with an Arabic summary. ISSN: 1012-5973
Abstract: Gross, light and scanning electron microscopy and immunohistochemical morphology of the non-ampullated part of the ductus deferens of sexually mature dromedary camels were studied with special reference to the changes and modifications occurring throughout its entire length. This part was divided into three anatomical regional segments; proximal tortuous (scrotal), middle less tortuous (inguinal) and distal straight (abdominal) segments. It is characterized by simple and low folded mucosa. It is lined by pseudostratified ciliated columnar epithelium with a thin lamina propria-submusosa. By scanning electron microscope, stereocilia of epithelial cells were tall and branched in the proximal segment tall, non-branched stereocilia in the middle segment and thick short microvilli in the distal segment. The muscular coat arranged in two layers; the inner layer was circular, while the outer layer was longitudinal. The intramural nerve fibre of the ductus deferens form plexuses in sub-epithelial tissue and in the muscular coat in addition larger nerve bundles in the serosa. Immunohistochemical reaction to protein gene product-9.5 (PGP-9.5) was used to demonstrate the general innervation pattern. The adrenergic and the cholinergic innervation were demonstrated using by immunohistochemical reactions to DPH and CHAT. These structural variations along the length of the vas deferens suggest that it performs functions other than just serving as a passageway for spermatozoa. Reproduced with permission of CAB.
Descriptors: dromedary camel anatomy, scrotum, ductus deferens, vas deferens, sperm, sexual maturity, immunohistochemistry, morphology, physiologica functions.

Sehrawat, S; Singh, A. **Anti-erythrocyte natural antibody activity in the unconventional 'heavy chain' immunoglobulins of Indian desert camel (*Camelus dromedarius*).** *Veterinary Immunology and Immunopathology*. 2006 June 15; 111(3-4): 139-147. ISSN: 0165-2427
DOI: http://dx.doi.org/10.1016/j.vetimm.2005.11.004
NAL call no: SF757.2.V38
Abstract: Members of the family Camelidae contain unconventional 'heavy chain' antibodies (HCAbs) that are devoid of light chains (LCs) in their structure and occur under physiological conditions. The spectrum of antigenic specificities in HCAbs and hence their biological significance is not known at present. Recent studies have however indicated that they contribute significantly towards the immunoglobulin (Ig) receptor diversity. The present study was planned to investigate the natural antibody (NAb) activity in camel HCAbs as further indication of the wide spectrum of their antigenic specificities. Detection of NAbs in the sera and isolated HCAbs of Indian Thar desert camels was undertaken against erythrocyte antigens (E-Ags) from eleven animal species including nine mammals, chicken and frog by using direct haemagglutination (HA) and indirect Coombs' test. HCAbs were found to behave as 'incomplete antibodies' and agglutinated erythrocytes of different animal species in indirect Coombs' test using rabbit anti-camel IgG3 (HCAbs) antiserum. Variations were noticed in the Coombs' titres against erythrocytes from different species. HCAbs also reacted against E-Ags in immunoblots. These findings provide further evidence that camelid HCAbs are produced against diverse antigens (Ags) under natural conditions, thereby contributing to camelid Ig receptor diversity.
Descriptors: dromedary camels, Indian desert camels, immunoglobulins, antibodies, erythrocytes, antigens, blood chemistry, agglutination, antiserum, heavy chain immunoglobulins, natural antibody activity.

Sonbol, RH. **Partial purification of paraoxonase from liver of camels.** *Journal of the Saudi Chemical Society.* 2006; 10(1): 57-62. ISSN: 1319-6103. Note: In English with an Arabic summary.
Descriptors: dromedary camels, liver, paraoxon, paraosonase, electrophoresis, purification, enzyme activity, enzymes, molecular weight.

Stahl, T; Sallmann, HP; Duehlmeier, R; Wernery, U. **Selected vitamins and fatty acid patterns in dromedary milk and colostrum.** *Journal of Camel Practice and Research.* 2006; 13(1): 53-57. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The aims of this study were to determine the concentrations of vitamins A, E, B< sub>1</ sub> and C as well as beta -carotene and to evaluate the fatty acid patterns of dromedary milk (*Camelus dromedarius*). Camel milk from different herds in the United Arab Emirates was analysed by HPLC as well as gas chromatographic methods and compared with milk from Holstein-Friesian cows of the same area. 46 dromedary camels served as the source of milk samples. Besides fresh camel milk, pasteurized and lyophilized milks were also analysed to evaluate the influence of these preservation methods on the determined parameters. Colostrum was directly tested after birth and in 5 individuals also during the first week after parturition. Blood samples were tested from the same herds for their vitamin content in order to find an eventual relation between milk and blood levels. Vitamins A, E, B< sub>1</ sub> and beta -carotene were significantly lower in dromedary milk, whereas vitamin C was

significantly (5-fold) higher compared to bovine milk. In camel colostrum, fat soluble vitamins and vitamin B< sub>1</ sub> were higher than in mature camel milk, but vitamin C was lower in colostrum. Pasteurization and lyophilization caused only small but significant vitamin losses. The total content of saturated and unsaturated fatty acids was similar in camel and cow milks. The differences in the fatty acid patterns were most evident only in omega-6 and omega-7 fatty acids. In dromedary serum, the vitamins A, B< sub>1</ sub> and C were significantly higher than in cow serum. Vitamin E was significantly higher in bovine serum. Regarding the vitamin content and fatty acid composition, it was concluded that camel milk was a good alternative to cow milk for human nutrition. Reproduced with permission of CAB.

Descriptors: cattle, dromedary camels, lactating females, different herds, camel milk composition, vitamin concentrations, ascorbic acid, beta carotene, colostrum, fatty-acids, retinol, saturated fatty acids, unsaturated fatty acids, vitamin B complex, vitamin A, vitamin A alcohol, vitamin A1, vitamin B, vitamin C, vitamin E, axerophthol, milk preservation, freeze drying, pasteurization, United Arab Emirates.

Szafranska, B; Panasiewicz, G; Majewska, M. **Biodiversity of multiple pregnancy-associated glycoprotein (PAG) family: gene cloning and chorionic protein purification in domestic and wild eutherians (Placentalia) - a review.** *Reproduction, Nutrition, Development.* 2006; 46(5): 481-502. ISSN: 0926-5287. Note: A review article.

DOI: http://dx.doi.org/10.1051/rnd:2006034

Abstract: This review presents a broad overview of chorionic glycoproteins encoded by the Pregnancy-Associated Glycoprotein (PAG) gene family and also serves to illustrate how the recent discovery of the PAG family has contributed to our general knowledge of genome evolution, placental transcription and placental protein expression. The complex and large PAG family is restricted to the Artiodactyla order, although single PAG-like genes have also been identified in species outside the Artiodactyla. The PAGs are members of the aspartic proteinase (AP) superfamily. Unexpectedly, however, some members of the PAG family possess amino acid substitutions within and around the active site that likely render them unable to act as proteinases. This paper summarizes the available information regarding biodiversity of PAG gene expression based on cDNA cloning, mRNA localization studies and the structural organization of the PAG genes with a particular emphasis on PAG promoters. It also compares available data regarding PAG protein purifications, sequencing and their N-glycodiversity. Finally, it discusses the scientific relevance, possible functional roles of the PAGs and describes possible profitable applications related to the detection of PAG proteins in the blood of pregnant domestic and wild species. Reproduced with permission of CAB.

Descriptors: pigs, moose, *Alces alces*, dromedary camels, alpacas, Artiodactyla, *Bison bonasus*, bison, buffaloes, cattle, elk, *Cervus elaphus canadensis,* goats, white tailed deer, *Odocoileus virginianus*, pigs, sheep, zebras, zebu, placentas, aspartic proteinases, glycoproteins, biodiversity, complementary DNA, DNA cloning, evolution, exons, gene expression, genes, genomes, introns, messenger RNA, nucleotide sequences, pregnancy, gestation, promoters, transcription.

Tang Bo; Cao GuiFang; Yang YinFeng; Wang XiuMei. **Development of RACE assay for amplification of full length sequence of camel beta -defensin cDNA**. *Veterinary Science in China.* 2006; 36(2): 151-156. ISSN: 1673-4696

Abstract: In order to obtain full-length cDNA sequence of camel beta -defensin (caBD-1), the 3' cDNA end of caBD-1 was cloned successfully by using anchored PCR-RACE with a specific primer as upstream primer, which was designed based on the known partial sequence of caBD-1 gene, and a 3' sites adaptor primer as down-stream primer. The 5' cDNA end was amplified rapidly by reverse nested PCR with a specific RT primer, whose 5' end was phosphated, and two specific reverse nested PCR primers. Results revealed that the RACE assays were able to amplify the full-length cDNA of caBD-1. Reproduced with permission of CAB.

Descriptors: dromedary camels, assays, complementary DNA, DNA amplification, nucleotide sequences.

Warda, M; Kim, H; Kim, N; Scholkamy, T; Prince, AB; Youm, JB; Park, WS; Kim, E; Han, J. **Proteomics study on one humped camel (*Camelus dromedarius*), an approach for better understanding the interplay between homeostasis and deviated environment.** *Molecular and Cellular Proteomics.* 2006; 5(10, Suppl. S): S210. ISSN: 1535-9476. Note: "HUPO 5th Annual World Congress, Long Beach, CA, USA; October 28-November 01, 2006."

Descriptors: dromedary analysis, proteomic analysis, imaging and microscopy techniques, 2 dimensional electrophoresis, matrix assisted laser desorption/ionization tor of flight mass spectrometry.

Warda, M; Linhardt, RJ. **Dromedary glycosaminoglycans: molecular characterization of camel lung and liver heparan sulfate.** *Comparative Biochemistry and Physiology B, Biochemistry and Molecular Biology.* 2006; 143(1): 37-43. ISSN: 1096-4959

DOI: http://dx.doi.org/10.1016/j.cbpb.2005.09.015

Abstract: Glycosaminoglycans (GAGs) are the portion of a proteoglycan that determine its final shape and function. The molecular structure of predominant GAG species in camel liver and lung is reported for the first time. The one-humped camel survives in an extreme, arid habitat and, thus, offers a good model to study the role of glycomics on homeostasis. Heparan sulfate (HS) from the lung and liver of the one-humped camel were isolated. Characterization of these newly isolated glycosaminoglycans included 1H NMR spectroscopy and disaccharide compositional analysis. The relative molecular weight of these GAGs was estimated by gradient polyacrylamide gel electrophoresis and their degree of sulfation was also assessed. Anticoagulant activity was determined using an anti-factor Xa assay and the HS from camel lung shows ~50% of heparin's activity. The structural differences of camel liver GAGs compared to human and porcine liver heparin and HS is discussed. Camel lung heparan sulfate resembles both heparin and HS in its structure and properties suggesting that it is either a highly sulfated form of HS, a mixture of heparin and HS or an undersulfated heparin.

Descriptors: dromedary camels, disaccharides, glycosaminoglycans, heparin sulfate, anticoagulant properties, characterization, liver, lungs.

Wernery, U; Johnson, B; Ishmail, WT. **Insulin content in raw dromedary milk and serum measured over one lactation period.** *Journal of Camel Practice and Research.* 2006; 13(2): 89-90. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: The insulin content in camel milk and blood serum were determined and compared during one lactation period. Milk samples were aseptically collected from 7 dromedaries immediately after parturition and then regularly over a period of 310 days. At the time of milking, blood samples were also taken from the dromedaries. Insulin concentrations were measured by radioimmunoassay (RIA) using a commercially available human insulin kit. The insulin content varied greatly between the different camels. Marked variations also occurred during the different lactation stages. The highest insulin content in milk was observed after parturition, with a mean of 286.5 micro U/ml during the first 48 h. After 48 h, the insulin content declined rapidly and reached a plateau which lasted for approximately 160 days. However, the insulin increased again before dry off. Insulin values were considerably higher in milk than in blood serum. The serum insulin did not increase after parturition like in milk, but it increased steadily from day 80 after parturition. The mean concentrations of insulin in camel milk and blood serum were 40.5+or-10.7 and 12.77+or-7.62 micro U/ml, respectively. Reproduced with permission of CAB.

Descriptors : dromedary camels, parturition, lactation stage, camel milk, insulin, blood serum, radioimmunoassay, immunoradiometric assay, radioimmunosorbent assay.

Wernery, U. **Camel milk, the white gold of the desert.** *Journal of Camel Practice and Research.* 2006; 13(1): 15-26. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: New World camelids are not milked, but the milk of Old World camelids is being used for many centuries. The two-humped camel lives in cold climate, hence their milk fat can reach levels of 8% which serves as an energy source for the newborn. The one-humped camel lives in hot climatic zones, hence the fat content is low, but the water content is high. The camel udder possesses 4 quarters, one teat per quarter and 2 teat canals per teat, sometimes even 3. One of the most remarkable features of dehydrated camels is the ability to continue lactation and to secrete milk that is highly diluted with over 90% water content. A temperamental camel cow which does not like or know its milker will simply cease production, but a contented camel can produce milk for a very long period. Globally, the milk productivity of camels is more than 5 times lower than the milk productivity of cattle. The camel's mammary gland possesses at least 8 (4x2) independent milk units. The camels are milked by hand. A pilot camel milking project using bucket milking machines began at CVRL in 2001. A modern camel dairy farm with the intention of milking several hundred dromedaries will be opened in autumn 2006 in Dubai under the name Dubai Camel Dairy Farm (DCDF). Mastitis in camels is rare. Treatment of camel mastitis is carried out parenteral due to the narrow teat canals. No bacteriological standards exist for raw and pasteurized camel milk. Transformation from colostrum to normal milk is reached after 7-10 days. The colostrum of camels is white like normal milk. Duration of milk letdown is very short, about one to two min, therefore milking from both sides is essential. Camels should be milked several times a day. Good milkers can produce 20-30 litres daily. Camel milk is a rich source of proteins with potential antimicrobial and protective activity. Components of camel milk

differ considerably from those of ruminants and have strong similarities to those of human. Camel fat contains a higher concentration of long chain fatty acids (C14-C18) than short chain fatty acids, and is therefore healthier. Camel milk contains less vitamin A, B< sub>2</ sub> folic acid and pantothenic acid than cow milk. On the contrary, the content of niacin and vitamin C is remarkably higher than in cow milk. The high concentration of vitamin C and the high water content are the most eminent factors of camel milk. Whey proteins in camel milk are more heat resistant than those of cow milk. The degree of denaturation varies in camel milk from 32 to 35% at 80 degrees C. In cow milk, 70-75% of whey proteins are denatured at this temperature. Pasteurization at 72 degrees C for 5 min reveals only 5-8% losses of camel milk composition investigated. Lactation periods of up to 24 months are known to occur in dromedaries. Camel milk proteins are different to that of cow milk. This may be the reason why no allergies to camel milk proteins are known. Camel milk does not coagulate easily. It passes the acidic stomach undisturbed and reaches the intestines for absorption. Camel milk contains 5 times more vitamin C compared to cow milk. Camel milk contains insulin and is therefore used to treat diabetes mellitus. Camel milk contains medicinal properties to treat different ailments such as autoimmune diseases, allergies, asthma, rash, diabetes, infectious diseases like tuberculosis, stress, peptic ulcers and cancer. It is a booster of the immune system. Camel milk products are consumed commercially as fresh, raw or pasteurized milk and cheese, especially soft cheese in West Africa (caravane made in Mauritania), ice creams with different flavours, milk shakes, puddings (creme brulee and panna cotta), Arabian dish mohabila and susa (North-Eastern Africa) or shubat (Kazakhstan) as sour milks. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, lactating camels, milking, camel milk, milk composition, colostrum, medicinal properties, milk products, milk proteins, milk quality, antibacterial properties, fat, fatty acids, immunoglobulins, gamma gabulins, lactoferrin, lactoperoxidase, lysozyme, N acetyl beta glucosaminidase, nicotinic acid, vitamins, whey protein, bactericidal properties, pasteurization, denaturation, heat treatment mammary glands, mastitis, *Arcanobacterium pyogenes,Escherichia coli*, *Pasteurella multocida*, *Staphylococcus aureus*, *Streptococcus agalactiae*.

Yagil, R. **Reproductive processes in camels (*Camelus dromedarius*).** *Israel Journal of Veterinary Medicine.* 2006; 61(2): 52-55. ISSN: 0334-9152
Abstract: Interest in the camel's (*Camelus dromedarius*) reproductive processes only began when its economic benefits became apparent. There are specific anatomical, behavioral, physiological and endocrinological peculiarities of camel reproduction, and data available about 30 years ago were gathered from discussions with nomadic camel herders and based on their direct needs. Camel reproduction has gathered momentum in the meanwhile, and well-equipped laboratories are now performing the most modern techniques. Most camels are found in Third World countries where they provide marketable products, therefore the focus should be on techniques that take into account the herders' level of competence.
Descriptors: dromedaray camels, camel anatomy, camel behavior, endocrinology, morphology, reproduction.

2005

Abdel Rahim, AG. **The relationship between whole blood selenium (Se) concentration and the activity of the seleno-enzyme, glutathione peroxidase (GSH-Px, E.C.I.11.1.9) in camel (*Camelus dromedarius*).** *Journal of Arid Environments.* 2005 July; 62(2): 359-362. ISSN: 0140-1963

Descriptors: *Camelus* , dromedary camels, selenium, blood, chemical concentration, glutathione peroxidase, enzyme activity, grazing.

Abdel Rahman, MA; Mosaad, GM. **Effect of feed and water deprivation on nutrient digestibility, behavioural and metabolic patterns of one humped camel (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal.* 2005; 51(105): 58-79. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: Six-year-old one humped camels (n=5), 550 kg, were used in this investigation. Animals appeared to be clinically healthy and parasitological examination revealed no gastrointestinal infections. The five animals forming one group were used in four trials alternating in intentional testing sequence. Trial one was used as a control and animals were fed for 7 days with the control diet. Trial one was followed by three trials of successive periods of feed and water deprivation (trials 2, 3, and 4). Each period of deprivation was interrupted by a phase of 4 days refeeding. During the feeding period, all animals were fed as group on commercial concentrate mixture (1.5 kg/head/day), barseem and wheat straw ad libitum. In addition, additives were added daily to the concentrate mixture at a level of 0.14 kg/head/day. Animals were cleaned periodically to prevent them from eating their dung. On the last day of all the trials, experimental camels were examined clinically to determine their health status. Dry matter and water intake as well as changes in the body weight were recorded. Changes in the digestibility of different nutrients after different periods of deprivation were also estimated. Moreover, blood serum was analysed for some biochemical parameters. Ingestive behaviour of the experimental camels was recorded within the first hour on the last day of the control and the first day of refeeding periods. The obtained results revealed that prolonged deprivation of food and water appeared as a stress factor on camels with a clear and obvious effect on their health status, nutrient digestibility, water intake, body weight, some behavioural and biochemical parameters. This suggests that any prolonged water and food deficit among housed camels must be corrected. Reproduced with permission of CAB.

Descriptors: dromedary camels,blood serum, diet, digestibility, dry matter, feed intake, metabolism, nutrients, plane of nutrition, refeeding after starvation, stress factors, water deprivation, water intake.

Al Qarawi, AA. **Infertility in the dromedary bull: a review of causes, relations and implications.** *Animal Reproduction Science.* 2005 June; 87(1-2): 73-92. ISSN: 0378-4320

NAL call no .: QP251.A5

Descriptors: dromedaries, males, male fertility, literature reviews, breeding season, mating frequency, estrus, female fertility, reproductive disorders, infection, testes, spermatozoa, anabolic steroids, testosterone, libido, sperm motility, inflammation, animal injuries, pregnancy rate, estrogens, hormone secretion, thyroid diseases, African trypanosomiasis, histamine, hyperestrogenemia.

Al Sagair, OA; Fathalla, SI; Abdel Rahman, HA. **Reference values and age-related changes in cerebrospinal fluid and blood components in the clinically normal male dromedary camel.** *Journal of Animal and Veterinary Advances.* 2005; 4(4): 467-469. ISSN: 1680-5593

Abstract: There is limited information regarding the influence of age on cerebrospinal fluid (CSF) and blood components of the one-humped camels. To demonstrate these relationships, CSF and blood were collected from two age groups of male camels (1- >3 and 3-5 years). Most of CSF tested parameters (urea, creatinine, uric acid, total protein and non albumin protein) in large age group showed a significant difference relative to small age camel group, except glucose, albumin and electrolytes contents (Na, K and Cl). Age had no significant effect on the serum component, except on the urea, creatinine and uric acid. These differences especially in CSF parameters between the two age groups may suggest that blood-brain barrier is not at the same stage of maturation or selective permeability. Reproduced with permission of CAB.

Descriptors: dromedary camels, age, blood chemistry, blood protein, cerebrospinal fluid, chemical composition, creatinine, urea, uric acid, plasma protein, serum protein.

Al Sagair, OA; Fathalla, SI; Abdel Rahman, HA. **Reference values and age-related changes in cerebrospinal fluid and blood components in the clinically normal male dromedary camel.** *Veterinary Medical Journal Giza.* 2005; 53(2(1)): 439-444. ISSN: 1110-1423. Note: "Biotechnology and Animal Wealth Development. Proceedings of the 8th Scientific Conference, Giza, Egypt, 17-19 April."

Abstract: Cerebrospinal fluid (CSF) and blood were collected from two age groups of male camels (1->3 and 3-5 years old). Most of the CSF tested parameters (urea, creatinine, uric acid, total protein and non albumin protein) in the older age group had significant differences relative to the younger age camel group, except for glucose, albumin and electrolytes contents (sodium (Na), potassium (K) and chloride (Cl)). Age had no significant effect on the serum component except for urea, creatinine and uric acid in the both age groups. These differences especially in CSF parameters between the two age groups may suggest that blood-brain barrier is not at the same stage of maturation or selective permeability.

Descriptors: dromedary camels, male camels, age differences, blood chemistry, reference values, blood-protein, cerebrospinal fluid, urea, creatinine, uric acid, total protein and non albumin protein, chloride, potassium, sodium, serum albumin.

Al Sobayil, FA. **Circadian rhythm of bone formation biomarkers in serum of dromedary camels.** *Veterinary Medical Journal Giza.* 2005; 53(3): 873-882. ISSN: 1110-1423

Abstract: The circadian rhythm of biomarkers of bone formation including osteocalcin and bone alkaline phosphatase (BAP) was studied in the serum of dromedary camels. Blood samples were collected every 60 minutes for 24 h from 10 healthy adult female camels. ELISA was used to determine the concentrations of serum osteocalcin and BAP. The results showed a marked fluctuation in the concentration of osteocalcin during the 24 h period with minimum and maximum levels at 13.00 and 18.00 h, respectively. Slight fluctuation was observed in the concentration of BAP with minimum and maximum levels at 1.00 and 12.00 h, respectively. The correlation between the two biomarkers was weak. In conclusion, it is important to fix the time of blood sampling for the analysis of osteocalcin concentrations, but not for BAP. Reproduced with permission of CAB.

Descriptors: dromedary camels, alkaline phosphatase, blood sampling, bone formation, bones, circadian rhythm, ELISA, osteocalcin, alkaline phosphomonoesterase, bone calcification.

Aly, SA. **Hygienic quality of Egyptian camel milk.** *Journal of Camel Practice and Research.* 2005; 12(2): 135-140. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Fifty raw Egyptian camel milk samples were randomly collected under sterile conditions from different dromedary camel herds at El-wahat El-baharia, Giza Governorate, Egypt [date not given]. 30% of the examined samples were positive for aerobic sporeformers, 24% were positive for coliforms and 20% were positive for enterococci. *Pseudomonas*, *Aeromonas* spp. and coagulase positive *Staphylococcus aureus* were isolated. *Salmonella*, *Listeria* and *Yersinia* species could not be isolated. Many fungal species were isolated, including *Aspergillus*, *Penicillium,Alternaria*, *Acremonium* and *Chrysosporium* species. The lipolytic activity and aflatoxin production of the isolated moulds were examined. Among 90 fungal stains tested, 70 were positive for lipolytic activity with varying degrees, while none of the screened *Aspergillus flavus* and *Aspergillus parasiticus* strains were aflatoxin B1, B2, G1 and G2 producers. The economical and public health importance of the isolated microorganisms as well as control measures for improving the milk quality are discussed. Reproduced with permission of CAB.
Descriptors: dromedary camels, raw milk sampling, camel milk, coliform bacteria, bacterial counts, food contamination, microbial contamination, aflatoxins, milk hygiene, milk quality, mycotoxins, poisoning, sporeforming bacteria, toxicity, *Acremonium*, *Aeromonas*, *Alternaria*, *Aspergillus*, *Aspergillus flavipes*, *Aspergillus parasiticus*, *Chrysosporium*, *Enterococcus*.

Baars, RMT; Kebebew, T. **Milk production performance of pastorally managed camels in eastern Ethiopia.** *Tropical Agriculture*. 2005; 82(3): 197-203. ISSN: 0041-3216
NAL call no: 26 T754
Abstract: Milk production of 30 lactating camels belonging to 1 herd of 100 heads was monitored during 19 months from March 1996 to September 1997 in eastern Ethiopia. The effects of season of calving, parity, and calf survival up to weaning on mean daily yield, peak yield, total lactation yield, lactation length, days open, and calving interval were assessed. The least square means (+or-standard deviation) of the daily, peak, and lactation yield were 7.5+or-0.5, 11.5+or-0.5, and 2104+or-97 L, respectively. The least square means of lactation length, days open, and calving interval were 282+or-10, 199+or-13, and 573+or-14 days, respectively. All parameters were significantly ($P<0.05$) affected by the season of calving. The maximum lactation yield was observed for camels in the third and fourth lactations. The lactation curves had a typical shape, although less pronounced for camels that calved during the long dry season. Camels that calved in the long wet season and older camels showed a lower persistency. Camels whose calves died before weaning showed a significantly higher yield than camels whose calves stayed alive. The fat, protein, casein, total solids, and solids non-fat were 39+or-4, 29+or-3, 23+or-2, 131+or-6, and 92+or-6 g kg-1, respectively. They were all significantly affected by parity and month of lactation. It was concluded that during the dry season, the herd produced a substantial amount of milk for the pastoralists. Reproduced with permission of CAB.

Descriptions: dromedaries, camel milk, casein, lactation curve, lactation duration, milk composition, milk fat, milk production, milk protein, milk yield, parturition, parturition interval, performance, seasonal variation, seasonality, seasons, solids not fat, survival, total solids, butterfat, milk constituents, seasonal changes, seasonal fluctuations, Ethiopia, Abyssinia.

Badryyah; Al Suwaigh, R; Ebtesam; Al Suhaimi, A. **Comparative study on some biochemical constituents of plasma in male camels and goats.** *Journal of Camel Practice and Research.* 2005; 12(2): 141-143. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Blood samples were collected from 36 and 14 male dromedary camels and goats, respectively, aged 2 years. The concentration of glucose, total cholesterol (CH), triglyceride (TG), high density lipoprotein (HDL), low density lipoprotein (LDL), very low density lipoprotein (VLDL), total protein, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were measured. It was shown that the plasma glucose level in camels was significantly higher than that of goats (P<0.001). No significant difference was observed in lipoprotein concentrations of the two species. Also, both species showed lower concentrations compared with other species. Total protein showed no significant difference between both species. The activities of AST and ALT in camel plasma was significantly lower than those in goats (P<0.001). A significant positive correlation was found between glucose and cholesterol and significant negative correlation between enzymes and for both glucose and cholesterol. Reproduced with permission of CAB.

Descriptors : dromedary camels, goats, alanine aminotransferase, aspartate aminotransferase, blood chemistry, blood proteins, blood sugar, cholesterol, enzyme activity, high density lipoprotein, low density lipoprotein, normal values, species differences, triacylglycerols, very low density lipoprotein, glutamate pyruvate transaminase, GOT, GPT, triglycerides.

Barri, MES; Al Busadah, KA; Homeida, AM. **Comparative calcium and magnesium status in adult and young camel (*Camelus dromedaries*).** *Scientific Journal of King Faisal University Basic and Applied Sciences.* 2005; 6(2): 151-158. ISSN: 1658-0311. Note: In English with and Arabic summary.

Abstract: Serum calcium (Ca) and magnesium (Mg) concentrations were measured in 30 calf camels at different 5 age groups (1-12 month), and were compared to that of adult camels. At the age of 1-4 month, serum Ca and Mg concentrations were found to be higher than adult values. Inorganic phosphorus concentration was found to be comparable to adult values. At the age above 4 month, serum calcium and magnesium concentrations started to decline to values below the adult ones. The results of this study may suggest that, the hypercalcaemia and hypermagnesaemia observed in other mammals late in pregnancy and early neonatal life may persist in the calf camel up to the age of 4 month emphasizing a role for calcium and magnesium in the young growing calf camel. Reproduced with permission of CAB.

Descriptors: dromedary camels, new born animals, neonates age groups, comparison study, calcium, hypercalcaemia, hypermagnesaemia, inorganic phosphorus, magnesium, hypercalcemia, hypercalcinemia, hypermagnesemia.

Barsham, MA; El Bagir, NM; Barri, MES. **Serum biochemical changes associated with experimentally-induced hypothyroidism in one-humped camels (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2005; 12(2): 117-121. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A state of hypothyroidism was induced in dromedary camels by the repeated daily intramuscular injection of sodium thiocyanate (3 mg/kg body weight) for 3 consecutive months. Serum biochemical parameters and blood glucose were studied. The means and standard deviations for the 1st, 2nd and 3rd months were total protein 6.46+or-0.42, 5.98+or-0.57 and 5.62+or-0.48 g/dl; albumin 2.68+or-0.21, 2.26+or-0.30 and 2.30+or-0.11 g/dl; globulins 3.79+or-0.53, 3.73+or-0.47 and 3.34+or-0.44 g/dl; inorganic phosphorus 6.14+or-1.03, 5.98+or-0.69 and 4.60+or-0.77 mg/dl; cholesterol 71.04+or-7.91, 72.57+or-22.39 and 73.57+or-5.55 mg/dl; triacylglycerols 49.41+or-7.59, 58.62+or-14.6 and 51.04+or-11.61 mg/dl; glucose 88.65+or-8.59, 101.43+or-16.74 and 101.39+or-9.67 mg/dl; alkaline phosphatase activity 27.61+or-2.8, 36.30+or-6.52 and 25.95+or-4.2 IU/litre and creatinine 1.93+or-0.24, 1.88+or-0.26 and 1.86+or-0.17 g/dl, respectively. There was a significant (P<0.01) reduction in serum total protein, albumin, globulin, inorganic phosphorus concentrations and significant (P<0.01) increase in serum cholesterol concentration, alkaline phosphatase activity and blood glucose levels throughout the course of the experiment. No significant change was observed in creatinine level.

Descriptors: dromedary camels, alkaline phosphatase, blood chemistry, blood plasma proteins, blood sugar, cholesterol, clinical aspects, creatinine, enzyme activity, globulins, hypothyroidism, thyroid, inorganic phosphorus, serum albumin, thiocyanates, thyroid gland, triacylglycerols.

Bartha, T; Sayed Ahmed, A; Rudas, P. **Expression of leptin and its receptors in various tissues of ruminants.** *Domestic Animal Endocrinology.* 2005; 29(1): 193-202. ISSN: 0739-7240. Note: "The Fifth International Conference on Farm Animal Endocrinology, Budapest, Hungary. July 4-6, 2004."

DOI: http://dx.doi.org/10.1016/j.domaniend.2005.03.010

Abstract: The energy metabolism of domestic animals is under the control of hormonal factors, which include thyroid hormones and leptin. Leptin signals from the periphery to the centre. It is mostly produced in the white adipose tissue and informs the central nervous system (CNS) about the total fat depot of the body. Low and high levels of leptin induce anabolic and catabolic processes, respectively. Besides controlling the food uptake and energy expenditure leptin is also involved in regulation of the reproduction and the immune system. Leptin is produced in several tissues other than fat. In the present paper the leptin expression of ruminant (Egyptian water buffalo, cow, and one-humped camel) tissues are examined. The mammary gland produces leptin in each species investigated. The local hormone production contributes to milk leptin and most probably helps to maintain lactation. Considerable leptin receptor expression was observed in the milk-producing epithelial cells, which is the same cell type that produces most of the udder leptin. Based on the results tissues participating in production have an autoregulative mechanism through which tissues can be relatively independent of the plasma leptin levels in order to maintain the desired function. Reproduced with permission of CAB.

Descriptors: dromedary camels, cattle, cows, buffaloes, ruminants, camel tissues, hormone receptors, leptin, mammary glands.

Bogner, Peter; Miseta, Attila; Berente, Zoltan; Schwarcz, Attila; Kotek, Gyula; Repa, Imre. **Osmotic and diffusive properties of intracellular water in camel erythrocytes: Effect of hemoglobin crowdedness.** *Cell Biology International.* 2005; 29(9): 731-736. ISSN: 1065-6995
Descriptors: camels, red blood cells, erythrocytes, osmotic resistance, witer binding, high hydrophilicity of camel hemoglobin, relationhip between water diffusion and osmotic characteristics of intracellular water, augmented water binding, closes hemoglobin packaging in vivo, slower apparent diffusion coefficient, compared to human data.

Borchman, D; Yappert, MC; Afzal, M; Tang, D. **Lens lipids and maximum lifespan.** *IOVS*. 2005; 46(Suppl. S): 1030. ISSN: 0146-0404. Note: "Annual Meeting of the Association for Research in Vision and Ophthalmology, Ft Lauderdale, FL, USA; May 01 -05, 2005."
Abstract: Purpose: Unlike in most organs, the lipid composition of lenses varies dramatically among species and with age. The focus of this study is to assess how these changes relate to lifespan. Studies on cataract suggest that the lens may serve as a window into the processes leading to accelerated mortality. As a first step toward elucidating cellular processes in the lens that may serve as markers for accelerated mortality, we examined the correlation between species-dependent and age-related lens lipid compositional differences and maximum lifespan.Methods: P-31-NMR spectroscopy was used to measure phospholipid composition. Fourier transform infrared spectroscopy was used to measure lipid molecular structure. In addition to a variety of species, we included data from camels, which, even in old age, rarely develop cataracts although they live under adverse conditions.Results: Camel lens lipids were mainly composed of sphingolipids (77 %) and phosphatidylcholines (23 %). Bovine lens lipid composition was comparable to a previous study, and both bovine lens sphingolipids, phosphatidylcholines and camel lens phosphatidylcholines content fit well (within the 95% confidence limits) in the curve obtained by plotting maximum life spans of other species with sphingolipids and phosphatidylcholines. Lifespan was directly related to lenssphingolipid content and indirectly related to lens phosphatidylcholine content. The camel lens sphingolipid value was significantly above the curve for other species. Except for the camel lens nucleus, lipid order and sphingolipid content were linearly related, $p < 0.005$, with a slope of 0.85 +/- .07, and intercept of 6.9 +/- 3.8. Lipid phase transition temperature and sphingolipid content were also linearly related, $p = 0.01$, with a slope of 0.20 +/- .07, and intercept of 21.7 +/- 5.3.Conclusions: Our data support the hypothesis that humans have adapted so that their lens membranes have a high sphingolipid content that confers resistance to oxidation, allowing these membranes to stay clear for a relatively longer time than is the case in many other species. Age-related changes in human lens lipid composition may serve as a marker for oxidative stress and may reflect systemic oxidative insult, providing a window into the health of an individual.
Descriptors: camels, humans, various species, lens of the eye, lipid composition, sphingolipids and phosphatidylcholines, resistance to oxidation, cataracts are rare in camels,

Cairo University Faculty. **Biotechnology and Animal Wealth Development. Proceedings of the 8th Scientific Conference, Giza, Egypt, 17-19 April.** *Veterinary Medical Journal Giza.* 2005; 53(2(1)): 1-444. ISSN: 1110-1423

Abstract: This proceedings contain 22 various topics from different experts and animal scientists of various fields. The major topics covered are: animal genetics and chromosomal aberrations viral nucleotide sequencing; bacterial drug resistance; immune response and immunity; vaccine efficacy and development; probiotics; bacterial diseases; diagnosis and diagnostic technique; growth promoters; virology; pathogenesis; immunology; viral diseases and drug therapy. Some of the topics also discuss animal physiology and nutrition in relation to reproductive performance, food chemistry and toxicology. The animals studied were sheep, goats, buffaloes, cattle and camels. Tables, graphs and pictures are also presented in each article. The topics are intended for veterinarians, animal scientists, epidemiologists, biologists, researchers and students. Reproduced with permission of CAB.

Descriptors: dromedary camels, cattle, buffaloes, goats, sheep, animal nutrition, animal physiology, bacterial diseases, chromosome aberrations, chromosomes, diagnosis, diagnostic techniques, disease control, disease prevention, drug resistance, drug therapy, feed additives, growth promoters, immune response, immunity, immunization, immunology, nucleotide sequences, nucleotides, pathogenesis, probiotics, reproductive performance, toxicology, vaccine development, viral diseases, growth stimulants, bacterial infections, viral infections, immunological reactions, Egypt.

Cherzekov, A; Saparov, G. **The milk productivity of the camel Arvana breed and its use.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 215-220. ISBN: 1586034731

Abstract: In Turkmenistan, the Arvana camel has been selected for different purposes, especially for milk production. Some lines of camels were selected in the state farm. Its milk productivity can be high and can reach more than 2500 kg of milk in one lactation. The milk production is higher in spring. Camel milk has medical and nutritional properties. Camel milk processing into local traditional products is widely done in the country. Reproduced with permission of CAB.

Descriptors: dromedary camels, Arvana breed, breed uses, selection for breeding, lactation duration, milk composition, milk production, camel milk products, camel milk yields, seasonality, Turkmenistan, Central Asia.

Chilliard, Y; Delavaud, C; Bonnet, M. **Leptin expression in ruminants: nutritional and physiological regulations in relation with energy metabolism.** *Domestic Animal Endocrinology.* 2005; 29(1): 3-22. ISSN: 0739-7240. Note: "The Fifth International Conference on Farm Animal Endocrinology, Budapest, Hungary. July 4-6, 2004."

DOI: http://dx.doi.org/10.1016/j.domaniend.2005.02.026

Abstract: Leptin, mainly produced in adipose tissue (AT), is a protein involved in the central and/or peripheral regulation of body homeostasis, energy intake, storage and expenditure, fertility and immune functions. Its role is well documented in rodent and human species, but less in ruminants. This review is focused on some intrinsic and extrinsic factors which regulate adipose tissue leptin gene expression and leptinemia in cattle, sheep, goat and camel: age,

physiological status (particularly pregnancy and lactation) in interaction with long-term (adiposity) and short-term effects of feeding level, energy intake and balance, diet composition, specific nutrients and hormones (insulin, glucose and fatty acids), and seasonal non-dietary factors such as photoperiod. Body fatness strongly regulates leptin and its responses to other factors. For example, leptinemia is higher after underfeeding or during lactation in fat than in lean animals. Physiological status per se also modulates leptin expression, with lactation down-regulating leptinemia, even when energy balance (EB) is positive. These results suggest that leptin could be a link between nutritional history and physiological regulations, which integrates the animal's requirements (e.g., for a pregnancy-lactation cycle), predictable food availability (e.g., due to seasonal variations) and potential for survival (e.g., body fatness level). Reaching permissive leptin thresholds should be necessary for pubertal or postpartum reproductive activity. In addition to the understanding of leptin yield regulation, these data are helpful to understand the physiological significance of changes in leptin secretion and leptin effects, and how husbandry strategies could integrate the adaptative capacities of ruminant species to their environment.

Descriptors: dromedary camels, cattle, dairy cows, sheep, ewes, goats, ruminants, pregnancy, lactation, body fat, diet energy metabolism, feed intake, gene expression, hormones, leptin, photoperiod and seasonal changes, reviews.

Chilliard, Y; Bengoumi, M; Delavaud, C; Faulconnier, Y; Faye, B. **Body lipids and adaptation of camel to food and water shortage: new data on adipocyte size and plasma leptin.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 135-145. ISBN: 1586034731

Abstract: The ability of camels to cope with food or water shortage is exceptional. This can be attributed to several mechanisms of adaptation, including mobilization of body fat reserves during underfeeding and regeneration when food is available. In camel, the adipose tissues are mainly located in the hump (external) and around the kidney (internal perirenal fat, PF) and consist mainly of cells able to store lipids (adipocytes). However, the measurement of adipocyte size is scarcely performed, and no data are available on the variations of plasma leptin, a hormone secreted by adipocytes in mammalian species and can play a major role in the regulation of energy homeostasis. The aim of this paper was to review recently published and unpublished data from 3 experiments conducted jointly by 3 laboratories on the variations of adipocyte size/number and of plasma leptin in camels, as well as the nutritional and physiological factors which regulated them. Recent experiments showed that the mean adipocyte size was similar between the hump and PF, and was 100-700 picoliters in 70 adult male or female camels. These were in the range of values observed in cattle and sheep. Hump or PF weights were positively correlated and better explained by adipocyte size than number. Hump adipocyte size was positively correlated to hump height-hemicircumference and to hump lipid content. Hump biopsies during experiments with different levels of food or water allowance showed that adipocyte size decreased during a 2-month underfeeding, and this decrease was more marked when camels were previously overfed, whereas adipocyte size was unaffected by 3 weeks of water deprivation. However, dehydration increased fat mobilization, with an increase in plasma nonesterified fatty acids and a decrease in hump lipid content. A radioimmunoassay was developed for camel leptin using antibodies raised

against sheep leptin. The plasma leptin concentration was 2-9 ng/ml and positively correlated to hump lipid content or adipocyte size, but less closely than in cattle. It was unaffected by underfeeding and overfeeding, contrary to what was observed in cattle and sheep. Plasma leptin increased steadily (+20%) during 3 weeks of water deprivation and returned rapidly to the control level after 6 h of rehydration. Further studies would determine the role of leptin in the adaptation of camels to desert conditions. Reproduced with permission of CAB.
Descriptors: camels, physiological adaptions to stress, food and water shortage adaptions, overfeeding, rehydration, underfeeding, water deprivation, adipocytes, adipose tissue, body fat, dehydration physiological, fat mobilization, fatty acids, leptins, lipids, fat cells, overnutrition.

Deen, A; Vyas, S; Sahani, MS. **Testosterone profiles in the camel (*C. dromedarius*) during the rutting season.** *Israel Journal of Veterinary Medicine*. 2005; 60(1): 27-32, He 27. ISSN: 0334-9152
Abstract: The present study was conducted on 10 adult male camels over a period of 2 consecutive years to characterize peripheral plasma testosterone profiles in relation to rutting activity. Blood plasma testosterone profiles were monitored during pre-rut, rut and post-rut stages at weekly intervals by RIA. Testosterone concentration in peripheral plasma is low during the pre-rut period (342.93+or-43.90 ng/ml). Onset of rut activity is associated with significant rise in testosterone concentration (4213.94+or-278 ng/dl), which is maintained for 11-18 weeks followed by decline to basal levels. The onset of rise as well as decline varied individually. It is also not uncommon to observe complete absence of endocrine surge and rut behavior in some (1/5 in present study) males throughout breeding season. Genetic, nutritional, management, environmental or other possible reasons for this remains to be explored. It is not uncommon for certain young males to exhibit complete shyness when attempted for semen collection despite high testosterone concentration and other external sexual behavior symptoms, which apparently may be due to lack of exposure. The libido and production of semen into AV is maintained for 3-5 months followed by cessation, which also varied individually. Libido subsides in some males in March, in few more in April. Some males continue to have good libido by the end of May. After May, majority of the males lose libido and are rendered unable to copulate in AV. Cessation of libido and ability to copulate appears to be associated with decline in testosterone concentration. Cessation of libido appears to be due to erectile impotence. The critical level of testosterone required for erectile potency needs to be worked out. This work shows the correlation between hormone profiles and ambient temperature.
Descriptors: dromedary camels, breeding season, mating behavior, sexual behavior, libido, testosterone, hormone secretions, semen, seasonal variations, environmental temperature, radioimmunoassay.

Derar, DRI; Hussein, HA; Saleh, AM. **Morphometric and immunohistochemical variations in the camel (*Camelus dromedarius*) testis in relation to some endocrinological aspects during different seasons of the year.** *Assiut Veterinary Medical Journal.* 2005; 51(104): 273-287. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: Seasonal variation in serum testosterone, thyroxine and the testicular morphology were studied in 54 sexually mature and apparently healthy one-humped camels during the

different seasons of the year. The testosterone and thyroxine serum levels were measured, and 3 beta -hydroxysteroid dehydrogenase (3 beta -HSD) activity of Leydig cells was assessed immunohistochemically to aid in the interpretation of results. The activity of 3 beta -HSD was high during cold months and severely depressed with minimum activity in hot months. Concomitantly, serum testosterone and thyroxine levels increased during the winter and early spring and decreased thereafter. Their levels reached the peak during the months of January until April. These results suggested that 3 beta -HSD was a key enzyme in the regulation of the testosterone production in Leydig cells of the male dromedary. Thyroxine was a crucial hormone for the male reproductive activity during the breeding season in the dromedary and fluctuated in the same pattern as serum male androgen.
Descriptors: dromedary camels, male camels, morphology, morphometrics, testes, testicles, androgens, testosterone, thyroxine, enzyme activity, hydroxysteroid dehydrogenase, Leydig cells, seminiferous tubules, seasonal variation, seasonal fluctuations.

El Allali, K; Achaaban, MR; Vivien Roels, B; Bothorel, B; Tligui, NS; Pevet, P. **Seasonal variations in the nycthemeral rhythm of plasma melatonin in the camel (*Camelus dromedarius*).** *Journal of Pineal Research*. 2005; 39(2): 121-128. ISSN: 0742-3098
Abstract: Seasonal changes in the pattern of plasma melatonin were investigated in two groups of camels (*Camelus dromedarius*): 11 adult and six young camels. Animals were subjected to the outdoor conditions of a desert environment. Blood samples were taken at regular intervals of about 3 hr (added to particular samples at 1 hr before then 30 min and 1 hr after sunset, and 1 hr before and 1 hr after sunrise) for 24 hr at both solstices and equinoxes of the year. The plasma melatonin levels steeply increased soon after sunset and remained elevated throughout all the night. Then, melatonin concentrations progressively declined shortly before sunrise and returned to daytime basal levels 1 hr later. There was no seasonal variation in the amplitude or in the offset of the melatonin peak or in the daytime basal levels. The onset of the nocturnal peak was delayed by 2 hr in June at the summer solstice ($P<0.05$), which can be related to the changes in night length between the two solstices. A significant effect of age was observed in all seasons. Melatonin levels were higher in the young camel group (fall equinox: $P<0.001$; spring equinox: $P<0.01$; winter solstice: $P<0.01$; summer solstice: $P<0.05$). The pattern of melatonin secretion in the camel showed a significant seasonal variation parallel to the photoperiodic changes of the year. The observed decline of melatonin levels during an extra-light pulse in the middle of the night indicates the light control of melatonin synthesis. It is not yet known if, in this low latitude desert region, the seasonal breeding period of the camel is cued by the photoperiod. The data obtained, however, clearly demonstrate that the camel has the capacity to follow and to integrate photoperiodic changes through melatonin changes.
Descriptors: dromedary camels, age differences, arid desert climate, plasma melatonin variations, biological rhythms, diurnal variation; hormone-secretion, day length, photoperiod, reproduction, seasonal variation; spring, summer, winter.

El Hag, SEA; Shaddad, SA; Hassan, T. **Status of some chemical and biochemical parameters of camel blood in the rainy season in the Sudan.** *Journal of Animal and Veterinary Advances.* 2005; 4(8): 713-715. ISSN: 1680-5593
Abstract: The activities of glutamate oxaloacetate transaminase (GOT) and alkaline phos-

phatase (ALP) and the concentrations of cholesterol, total protein, albumin and bilirubin were determined in the sera of healthy rural camels (*Camelus dromedarius*, n=10) from the Butana area in Sudan during the summer season. The levels estimated were in general agreement with the normal levels reported by other investigators. The same investigations were carried out in the sera of rural healthy camels (n=26) during the rainy season in the same area. Significant changes were observed in the estimates of albumin SGOT and ALP.
Descriptors: dromedary camels,alkaline phosphatase, aspartate aminotransferase, bilirubin, blood protein, cholesterol, enzyme activity, seasonality, serum albumin, summer, wet season, alkaline phosphomonoesterase, GOT, plasma protein, rainy season, serum protein, Sudan.

El Khasmi, M; Fouad Riad; Abdallah Safwate; El Abbadi, N; Mohamed Farh; Faye, B; Coxam, V. **La chamelle allaitante face au stress calcique: une fonction endocrine adaptee aux conditions desertiques.[Lactating camels and calcic stress: adaptability of the endocrine function to desert conditions.]** *Secheresse*. 2005; 16(4): 261-267. ISSN: 1147-7806. Note: In French with an English summary.
URL: http://www.secheresse.info
Abstract: The physiological adaptation of lactating camels to desertic conditions involves remarkable endocrine regulation. 1,25dihydroxyvitamin D [1,25(OH)2D] and 25hydroxyvitamin D [25(OH)D] levels in camel blood plasma are 10-15 times higher than in ovine or bovine plasma. During the first days of lactation, plasma 1,25(OH)2D; 25(OH)D; somatomedine C (IGF-I) and osteocalcin concentrations are high, whereas those of thyroid hormones are low. These results suggest an accelerated bone turnover, and a plausible contribution to calcic homeostasis in spite of mammary calcium transfert. The colostrum is acid and rich in calcium, phosphorus, magnesium, parathormone-related peptide (PTHrP), 25(OH)D, thyroxine, and IGF-I. 1a,25(OH)2D3 increases calcium and phosphorus levels in plasma and milk in lactating camels, and intestinal calcium absorption in their newborns. In the latter, PTHrP enhances postprandial calceamia and phosphateamia, and intestinal xylose absorption.
Descriptors: dromedary camels, desert animals, physiological adaptation, desert climate, arid climate, arid lands, blood chemistry, lactation, camel milk, colostrum, calcium, magnesium, phosphorus, endocrine system, hormone secretion, insulin like growth factor, intestinal absorption, magnesium, osteocalcin, peptides, somatomedin, stress, thyroid hormones, thyroxine, vitamin D, xylose, somatomedin C, sulfation factor, sulphation factor, wood sugar.

Ephraim, E; Odenyo, A; Ashenafi, M. **Screening for tannin degradation by rumen and faecal samples of wild and domestic animals in Ethiopia.** *World Journal of Microbiology and Biotechnology.* 2005 Oct; 21(6- 7): 803-809. ISSN: 0959-3993
Descriptors: sheep, goats, dromedaries, *Leucaena pallida*, *Sesbania goetzei*, chemical constituents of plants, tannins, phenolic compounds, hydrolysis, wild animals, domestic animals, rumen, feces, gallic acid, tannic acid, *Sylvicapra grimmia*, *Madoqua guentheri*, *Equus quagga*, *Gazella granti*; *Alcelaphus buselaphus,* Ethiopia.

Faye, B. **Productivity potential of camels.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 127-134. ISBN: 1586034731

Abstract: It is accepted that camel has the ability to produce more milk than cow in similar conditions. However, the camel milk productivity is not well known. Data from the literature are scarce and mainly from observations in research stations. Data are more rarely from pastoral areas, where performance monitoring is uncommon. Elsewhere, the data are not homogeneous from one author to another with regards to mean daily yield, total yield per lactation and herd average. Therefore, the comparisons are not easy. Furthermore, there is a high variability of reported productions, which leads to suppose a potential for the selection on that criterion. This selection is possible but rarely achieved except in Soviet Union for dromedary and Bactrian camels. The world production of camel milk is officially estimated to be 1.3 million tonnes in 2002. However, according to the high level of self-consumption and of the individual potential, this production can probably be higher (i.e. 5.4 millions tonnes). The individual production varies between 1000 and 12000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is quite variable (from 8 to 18 months in general), but longer than that for dairy cattle in similar conditions. The feeding and seasonal conditions have an impact on performance. Some intensified systems occurring in many places showed good prospects in camel milk production to supply populations from arid lands.
Descriptors: dromedary camels, Bactrian camels, camel milk, dairy performance, lactation curve, lactation duration, milk consumption, milk production, milk supply, milk yield, seasonality, selection, genetic variation, genotypic variability, Africa, Asia.

Faye, B; Seboussi, R; Askar, M. **Trace elements and heavy metals in healthy camel blood of United Arab Emirates.** *Journal of Camel Practice and Research.* 2005; 12(1): 13-16. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: This study was conducted to determine the presence of different trace elements and heavy metals in the blood of 240 camels. The variation factors included age, sex and physiological status which were assessed for some parameters. The iron, copper, strontium, arsenic, zinc, selenium, boron and barium contents were 190.3, 60.1, 44.0, 22.5, 20.0, 19.7, 19.3 and 14.6 micro g/100 ml, respectively. Other minerals like aluminium (3.7 micro g/100 ml), molybdenum (2.9 micro g/100 ml), chromium (2.0 micro g/100 ml), nickel (1.8 micro g/100 ml), lead (1.5 micro g/100 ml), manganese (0.16 micro g/100 ml), cobalt (0.08 micro g/100 ml) and cadmium (0.07 micro g/100 ml) were also detected in very small amounts. The camel seems to be less efficient than other ruminants in detoxification so the sensitivity of camels to some toxic elements could be more important. It is suggested that other determinations of heavy metals and toxic elements in blood and other biological fluids be achieved for the standard values in camels.
Descriptors: dromedary camels, males and females, sex differences, physiological status, pregnancy, blood chemistry comparison study, heavy metals, trace metals, aluminium, arsenic, barium, boron, cadmium, chromium, cobalt, copper, iron, lead, manganese, molybdenum, nickel, selenium, strontium, zinc, United Arab Emirates.

Faye, Bernard; cEsenov, P. ***NATO Advanced Research Workshop on Desertification Combat and Food Safety (2004 : Ashkhabad, Turkmenistan). Desertification Combat and Food Safety.*** IOS Press, Amsterdam; Washington, DC: c2005. Note: NATO science series. Series

I, Life and behavioural sciences, 1566-7693; v. 362. ISBN: 1586034731. "Proceedings of the NATO Advanced Research Workshop on Desertification Combat and Food Safety, 19-21 April 2004, Ashgabad, Turkmenistan". Contents: Camel and desert : new trends of the camel sciences / Bernard Faye; Desertification in the Central Asian countries / I.S. Zonn; Camels of the Arvana breed : history, modern state, and perspectives for the development / B. Sopyev, G. Saparov, and O. Annamukhammedov; The camel and society / Franethcois Brey and Bernard Faye; Camel : history of its domestication / H. Yusupov; Participatory approaches to using the camel in combating desertification / Ilse Kohler-Rollefson and Hanwant Sing Rathore; The current status of the wild Bactrian camel / John Hare; Environmental education and public awareness : valuable tools in combating desertification / Kathryn Rae; Desertification and camel-breeding in Kalmykia (Russian Federation) / E. Gabunshchina and L. Dzhabrueva; Realization of the National Action Program to Combat Desertification in Turkmenistan / Muhamet Durikov and Jamal Annaklycheva; Diseases of camels, their preventive maintenance and treatment / B. Sopyev, B. Divanov, and C. Charyev; The most important infectious diseases in camelids / U. Wernery; Fungal infections of camelids / Falah K. Al-Ani and Jerry Roberson; Role and method of advising for producers in natural hardship conditions / Murat Aitmatov .. [et al.]; Factors affecting reproductive performance of camels at the herd and individual level / Ahmed Tibary, Abdelhaq Anouassi, and Abdelmalek Sghiri; Assisted reproduction in dromedary camels / J.A. Skidmore and M. Billah; Camel genetic resources and ways of camel breeding products use for population of Kazakstan arid areas / A. Tasov and N. Alybaev; Productivity potential of camels / Bernard Faye; Body lipids and adaptation of camel to food and water shortage : new data on adipocyte size and plasma leptin / Y. Chilliard .. [et al.]; Standards for camel milk / Uzi Merin .. [et al.]; Modern dairy products from traditional camel herding : an experience in Mauritania / Nancy Abeiderrahmane; Lactoferrin of camel milk of Kazakhstan / G. Konuspayeva .. [et al.]; -- Artificial nursing of camel calves : an effective technique for calves' safeguard and improving herd productivity / T. Khorchani, M. Hammadi, and M. Moslah; Camel dairy in eastern Africa : present state and future perspectives / Zakaria Farah and Mario Younan; Influence of feeding on camel milk components / Donata Cattaneo .. [et al.]; -- Probiotic properties of a sour-milk product : shubat from the camel milk / A. Serikbayeva .. [et al.]; The effectiveness of the people treatment with camel chal / T. Khodzhageldyev and B.G. Khodzhakuliyev; Development of products for child nutrition and for medical and prevention purposes on the base of camel milk / Yuri Aleksandrovich Sinyavskiy; Camel milk production and transformation in Sub-Saharan Africa / Mohammed Bengoumi, Gilles Vias, and Bernard Faye; Pasture ration of Arvana camels in desert pastures / H. Khanchaev; Meat productivity of the camel Arvana breed and ways to increase it / G. Saparov and O. Annageldiyev; The milk productivity of the camel Arvana breed and its use / A. Cherzekov and G. Saparov; Wool productivity and quality of fleece in the camel Arvana breed / O. Annageldiyev, G. Saparov, and M. Atayeva. Reproduced with permission of CAB.

Getnet, AM; Abebe, W; Mekonnen, H. **Hemogram of Issa type dromedaries in eastern Ethiopia.** *Online Journal of Veterinary Research*. 2005; 9(1): 48-56. ISSN: 1328-925X
URL: http://www.comcen.com.au/~journals/camelabs2005.htm
Abstract: Hemograms were conducted on 130 normal Issa camels from Dawa, Eastern Ethiopia. Mean red blood cell (RBC) count, hemoglobin (Hb) and packed cell volume (PCV)

were 7.49 mil/ micro l, 13.04 g% and 25% and mean corpuscular volume, hemoglobin concentration and hemoglobin were 35.26 fl, 51.21% and 18.1 pg respectively. Mean total white blood cell count, neutrophils, lymphocytes, eosinophils, monocytes and basophils were 14.2x103/ micro l, 7x103/ micro l, 6x103/ micro l, 0.72x103/ micro l, 0.54x103/ micro l and 0.06x103/ micro l respectively. Male camels were found to have significantly higher (P<0.05) PCV, Hb and RBC count than females, females on the other hand showed higher total WBC count (P<0.05) than males. The peak RBC and WBC counts were obtained in the age group 6-10 years. Compared to cattle, these values are higher owing to the unique adapted physiological features of camel. PCV, Hb concentration and RBC count are positively correlated. The coefficients of correlation computed were 0.4 for erythrocyte count and PCV, 0.46 for erythrocyte count and Hb and 0.67 for PCV and Hb. These results may be useful for physiological and behavioral research in camels. Reproduced with permission of CAB.

Descriptors: dromedary camels, basophils, coefficient of relationship, correlation, eosinophils, hematocrit, hematology, hemoglobin, leukocyte count, lymphocytes, monocytes, neutrophils, normal values, sex differences, cell count, eosinophil-leukocytes, Abyssinia, Ethiopia.

Gustafsson, Anki; Kacskovics, Imre; Breimer, Michael E; Hammarstrom, Lennart; Holgersson, Jan. **Carbohydrate phenotyping of human and animal milk glycoproteins**. *Glycoconjugate Journal.* 2005; 22(3): 109-118. ISSN: 0282-0080

Descriptors: human, cow, goat, sheep, pig, horse, dromedary, rabbit, breast milk, different carbohyudrate sturcture expressed.

Hammadi, M; Khorchani, T; Portetelle, D; Renaville, R. **Validation of a heterologous radioimmunoassay for insulin-like growth factor-I in camels.** *Journal of Camel Practice and Research.* 2005; 12(2): 111-116. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: This study was undertaken to develop a heterologous radioimmunoassay method for measuring IGF-I in camel serum. Precision, accuracy and limit of quantitation were the principal parameters used to judge validity of an acid-ethanol extraction method. Blood was taken from 20 suckling dromedary females and their calves. Dams were divided into 2 body condition score groups (group 1: 5.2+or-0.9 and group 2: 3.8+or-0.6; P<0.0001). The precision expected by the intra and inter-assay variation was in the range of 5-10% and 14-16%, respectively. In dilution buffer, recovery ranged from 98.4% in highest added quantity to 126.6% in lowest added quantity of IGF-I. In camel serum, recovery ranged from 92.4% to 107%. Sensitivity or displacement of the concentration of IGF-I in the diluted serum was acceptable until dilution 8 fold after what the precision of the recovery was very low. Dams and calves in group 1 had elevated (P<0.01) serum IGF-I concentration as compared to those in group 2 (41.6+or-14.3 ng/ml and 248.3+or-101.9 ng/ml vs. 26.6+or-2.9 ng/ml and 90.1+or-77.2 ng/ml, respectively). IGF-I was found to be less concentrated in dams than in calves in which the IGF-I serum concentration averaged 34.1+or-12.7 ng/ml and 169.2+or-119.7 ng/ml, respectively. Reproduced with permission of CAB.

Descriptors: dromedary camels, blood chemistry, body condition, insulin-like growth factor,

normal values, radioimmunoassay immunoradiometric assay, radioimmunosorbent assay, somatomedin C.

Karray, N; Lopez, C; Ollivon, M; Attia, H. **La matiere grasse du lait de dromadaire: composition, microstructure et polymorphisme. Une revue.[Dromedary milk fat: composition, microstructutre and polymorphism. A review.]** *OCL Oleagineux, Corps Gras, Lipides.* 2005; 12(5/6): 439-446. ISSN: 1258-8210. Note: In French with an English summary. A review of the literature.

Descriptors: Abstract: dromedary camel, composition of camel milk fat, butterfat, fatty acids, triacylglycerols, microstructure, fat globules size distribution, polymorphism, thermal and structural properties.

Khaskheli, M; Arain, MA; Chaudhry, S; Soomro, AH; Qureshi, TA. **Physico-chemical quality of camel milk.** *Journal of Agriculture and Social Sciences.* 2005; 1(2): 164-166. ISSN: 1813-2235

Abstract: The present study was carried out to investigate the quality of camel milk in Hyderabad, Pakistan. A wide variation was observed in the quality of raw camel milk. Specific gravity ranged between 1.014-1.017 (1.015+or-0.001), pH 6.57-6.97 (6.77+or-0.07) and acidity was 0.12-2.00 (0.18+or-0.01 g per 100 g). Total solids (TS), solids not fat (SNF), fat, protein, casein, lactose, ash and chlorides contents ranged between 7.76-12.13, 5.56-8.29, 1.8-5.0, 1.8-3.2, 0.78-2.76, 2.9-4.12, 0.85-1.00 and 0.20-0.28 g per 100 g, respectively. The mean values (g per 100 g) were 9.74+or-0.49 for TS, 7.12+or-0.35 for SNF, 2.63+or-0.40 for fat, 2.54+or-0.19 for protein, 2.21+or-0.02 for casein, 3.65+or-0.16 for lactose, 0.94+or-0.02 for ash and 0.26+or-0.01 for chlorides.

Descriptors: dromedary camels, raw camel milk, acidity, ash, casein, chlorides, lactose, milk composition, milk fat percentage, milk protein percentage, milk quality, pH, physicochemical properties, solids not fat, specific gravity, total solids, Pakistan.

Konuspayeva, G; Serikbayeva, A; Loiseau, G; Narmuratova, M; Faye, B. **Lactoferrin of camel milk of Kazakhstan.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 158-167. ISBN: 1586034731

Abstract: Lactoferrin is an iron-containing protein with a molecular mass of 76-80 kDa with 689 amino acids residues and 2 Fe3+ binding centres. This relatively recently known protein has a number of properties. It has antibacterial, antiviral, antifungal, anticarcinogenic, antiinflammatory, antioxidant and analgesic properties. Lactoferrin raises the immune response of the organism and is involved in Parkinson's and Alzheimer's diseases. Lactoferrin is present in all excretory secretions of mammals such as tears, saliva, blood, urea, nasal and uterus cavity, sperm and amniotic and also in the neutrophil of leukocytes. Mostly, lactoferrin is present in milk and colostrum. A comparative survey of lactoferrin concentration in different milks showed that the biggest content is in camel milk. Camel milk has 30-100 times higher concentration of lactoferrin than bovine milk. After heat treatment at 85 degrees C, camel milk still contains 37% of lactoferrin, whereas bovine milk only contains 1.2%. Bovine and camel lactoferrin are homologous in affinity, being 74.9%. Amino acid compound studies showed that camel lactoferrin is rich with Met, whereas bovine lactoferrin is rich with Val. Camel

milk is a traditional food product in Kazakhstan and accounted to be a health-promoting product that helps in healing and preventing many diseases. However, these properties of camel milk are still unproven by scientists. It is believed that lactoferrin is remarkably responsible for such properties of camel milk. Lactoferrin is also used as a preserving agent in food, medicines and cosmetics. Technologies of industrial purification are now developing. The number of use targets is rapidly growing. For example, lactoferrin can be used in diagnostics of inflammation processes. Reproduction with permission of CAB.
Descriptors: dromedary camels, camel milk, milk composition, antibacterial properties, anticarcinogenic properties, antifungal properties, anti-inflammatory agents, antiviral properties, immunity, iron binding capacity, lactoferrin, analgesics, Kazakhstan.

Mahmoud, KGM; Scholkamy, TH; Farghaly, A; Nawito, MF. **Chromosomal aberrations, sister chromatid exchanges and nuclear status of immature oocytes in relation to age of dromedary camels.** *Cytologia.* 2005; 70(3): 295-302. ISSN: 0011-4545
Abstract: The present study was conducted to analyse the chromosomes of blood culture and oocyte chromatin quality at the time of recovery in dromedary camels in relation to age. Twelve young (about one year) and twelve adult (4-10 years old) female camels were used. These animals with unknown reproductive history were slaughtered in Kerdasa abattoir (Giza province, Egypt). Blood samples were collected via sterile syringes from camels before slaughtering for chromosomal analysis. Oocytes from ovaries of both ages were aspirated from small antral follicles 1 to 5 mm in diameter and classified according to their quality into four categories. Nuclear status of cumulus oocytes complexes (COCs) were evaluated directly after collection. The results indicated that, the frequencies of chromosomal abnormalities and sister chromatid exchanges (SCE'S) were increased significantly ($p<0.05$) with age. An increase in structural aberrations could be observed. There were no significant differences between young and adult camels in total number and quality of oocytes. Statistically significant ($p<0.01$) differences were between percentages of germinal vesicle breakdown (GVBD) and Germinal vesicle (GV) in young and adult camels. It is concluded that, the increase of age may have significant effects on structural chromosomal aberrations, SCE'S and meiotic stages of immature camel oocytes but not on the number and quality of oocytes. Reproduced with permission of CAB.
Descriptors: dromedary camels, age groups, blood, chromatids, chromosome aberrations, chromosomes, genetic analysis, oocyte maturation, oocytes, ovarian follicles, ovaries, chromosome abnormalities.

Moges Dereje; Uden, P. **The browsing dromedary camel. II. Effect of protein and energy supplementation on milk yield.** *Animal Feed Science and Technology.* 2005; 121(3/4): 309-317. ISSN: 0377-8401
Abstract: An on-farm experiment was conducted in Erer Valley of Eastern Ethiopia to study the effects on milk yield in lactating dromedary camels, of supplementing with a protein or energy concentrates. The treatments were control: browsing only; energy supplement (ES): browsing+ground maize (*Zea mays*) and protein supplement (PS): browsing+decorticated groundnut (*Arachis hypogaea* L.) cake. The experiment was replicated both in the dry and wet seasons. Six dromedary camels with estimated live weights of 453-473 kg were allocated randomly at peak lactation to one of three treatments in a double 3x3 Latin Square design. All

camels were grazed during daytime hours, and camels receiving supplements were fed 4 kg of either supplement, divided in two equal morning and evening meals for a period of 63 days in both the dry and wet seasons. Milk yield differences between all treatments were significant (P< 0.001) with PS > ES > control, being 12.9, 9.1 and 7.6 kg for PS, ES and control, respectively. There were also differences (P< 0.05) between the treatments with regard to fat, with PS > control and ES, showing levels of 39, 37 and 37 g/l, respectively. Within-season variation in milk yields was similar among dietary treatments, and also highly significant (P<0.001). Milk yield and fat differences between seasons were also significant, with 9.2 and 10.4 kg milk (P<0.001) and 37 and 38 g/l fat (P<0.05), were recorded for the dry season and wet season, respectively. There were no differences between treatments and seasons with regard to milk protein contents. Results show that oil seed by-products with relatively high crude protein value, such as groundnut cake, have a substantial effect on milk production in camels. This finding is of particular importance for regions where traditional range feed resources are becoming scarce. Reproduced with permission of CAB.
Descriptors: dromedary camels, browsing behavior, browsing choices, feed resources, seasonal variations, energy levels from browsing, milk yields, milk composition, milk fat, butter fat, milk protein, protein supplements, Ethiopia, Abyssinia.

Mohamed, HE; Mousa, HM; Beynen, AC. **Ascorbic acid concentrations in milk from Sudanese camels.** *Journal of Animal Physiology and Animal Nutrition*. 2005; 89(1/2): 35-37. ISSN: 0931-2439
Abstract: The present study in Sudanese camels was done to describe the associations between vitamin C concentrations in milk, and either breed, stage of lactation, parity or the presence of mastitis. A total of 2586 camels were sampled. Arabi camels had higher ascorbic acid levels in milk than did either Anafi or Bishari camels. Milk ascorbic acid levels were higher for camels more than 180 days in lactation than for those earlier in lactation. Multiparous vs. primiparous camels had higher ascorbic acid concentrations in their milk. The ascorbic acid content of colostrum was higher than that of milk. Mastitis was associated with a decrease in the ascorbic acid content of both milk and blood plasma.
Descriptors: dromedary camels, lactation stage, camel milk, colostrum, ascorbic acid, vitamin C levels, breed differences, mastitis, Sudan, East Africa.

Mohamed, SA; Fahmy, AS; Mohamed, TM. **Carbohydrases in camel (*Camelus dromedarius*) pancreas. Purification and characterization of glucoamylase.** *Comparative Biochemistry and Physiology B,-Biochemistry and Molecular Biology.* 2005; 140(1): 73-80. ISSN: 1096-4959
DOI: http://dx.doi.org/10.1016/j.cbpc.2004.09.019
Abstract: The present study analysed the existence of carbohydrases in camel pancreas compared to some other ruminants. Disaccharidases (maltase, cellobiase, lactase, trehalase and sucrase), glucoamylase and a-amylase were detected in pancreas of camel, sheep, cow and buffalo. Enzyme levels in sheep were lower than in the other ruminants. The highest level was detected for alpha -amylase (EC 3.2.1.2). Moderate activity levels were detected for glucoamylase (EC 3.2.1.3) and maltase (EC 3.2.1.20), while other disaccharidases showed very low activity. The results suggested that, in addition to a-amylase, glucoamylase and maltase may be synthesized and secreted from pancreas to the small intestine in ruminants. Camel pancreatic glucoamylase was purified and characterized. The purification procedure included

glycogen precipitation and chromatography on DEAE-Sepharose and Sepharose 6B. The molecular mass was 58 kDa for native and denatured enzyme using gel filtration and SDS-PAGE, respectively. The enzyme had a pH optimum at 5.5 and a Km of 10 mg starch/mL with more affinity toward potato soluble starch than the other carbohydrates. Glucoamylase had a temperature optimum at 50 degrees C with heat stability up to 30 degrees C. The effect of different cations and inhibitors was examined. The camel pancreatic glucoamylase may possess an essential thiol.

Descriptors: dromedary camels, ruminants, pancreas, carbohydrases, alpha amylase, disaccharidases, enzyme activity, glucan 1,4 alpha glucosidase, glycosidases, pancreas, pH, species differences, amyloglucosidase, carbohydrases, exo 1,4 alpha-glucosidase, glucoamylase.

Mohammed Bengoumi; Faulconnier, Y; Ahmed Tabarani; Abdelmalek Sghiri; Faye, B; Chilliard, Y. **Effects of feeding level on body weight, hump size, lipid content and adipocyte volume in the dromedary camel.** *Animal Research*. 2005; 54(5): 383-393. ISSN: 1627-3583. Note: In English with a French summary.

Abstract: In order to study the effect of underfeeding and overfeeding on the fat deposition in the dromedary camel, 14 camels were divided into three groups: an overfed-underfed group (OV-UN), an underfed-overfed group (UN-OV) and a control group (CTRL). After a 4-wk adaptation, a cross-over design was applied for 16 weeks including two periods of 8 weeks each. The three energy levels in the diet corresponded to 17% (UN), 68% (CTRL) and 134% (OV) of the theoretical maintenance energy requirements. Body weight and barymetric parameters were measured weekly. Hump fat samples were collected monthly for determination of adipocyte size and lipid content. Overfeeding had or tended to have a significant effect on body weight, hump size, hump lipid content and adipocyte volume. Thus, the increase of the hump weight was 71% in the OV-UN group and 19% in the UN-OV group. Hump fat content increased from 52.9 to 63.6% in the OV-UN group and from 54.2 to 64.7% in the UN-OV group. Similarly, trends were observed for the adipocyte volume with an increase from 138 to 253 pL and from 275 to 346 pL in the OV-UN and UN-OV groups, respectively. Underfeeding had reverse effects: the hump weight decreased by 41% in the OV-UN group and 4% in the UN-OV group. Similarly, the hump lipid content decreased significantly in the OV-UN group from 63.6 to 53.0% and not significantly from 58.0 to 54.2% in the UN-OV group. Underfeeding decreased the adipocyte volume from 253 to 167 pL (OV-UN group) and from 292 to 275 pL (UN-OV group). A high significant positive correlation was observed between the hump lipid content and adipocyte volume. Low speed changes in the hump size, volume and lipid content could be linked to the camel adaptation to underfeeding conditions in dry areas.

Descriptors: dromedary camels, adipocytes, body measurements, body weight, energy intake, lipids, overfeeding, underfeeding, fat cells, lipins, overnutrition.

Naima Alim; Fondrini, F; Bonizzi, I; Feligini, M; Enne, G. **Characterization of casein fractions from Algerian dromedary (*Camelus dromedarius*) milk.** *Pakistan Journal of Nutrition.* 2005; 4(2): 112-116. ISSN: 1680-5194

URL: http://www.pjbs.org/pjnonline/fin260.pdf

Abstract: To characterize casein fractions in Algerian dromedary's milk, samples from two breeds, Larbaa and Targui, were analysed using electrophoretic and chromatographic tech-

niques. Analysis performed by isoelectric focusing showed heterogeneity within the same breed and between the breeds. Some samples featured a reduced beta-lactoglobulin content and one sample from Larbaa breed showed the lack of bands in the most acidic region, where kappa-casein focuses. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis of this sample allowed identifying the alpha< sub>s1</ sub>-, alpha< sub>s2</ sub>- and beta-casein fractions only. High s1 s2 performance liquid chromatography analysis of precipitated casein showed three main peaks. In order to characterize them, electrospray ionization-mass spectrometry was exploited. Their measured molecular masses were 24 760, 22 060 and 24 970, corresponding to alpha< sub>s1</ sub>-, alpha< sub>s2</ sub>- and beta-casein. Analytical s1 s2 results suggested the absence of kappa-casein in this sample. Nevertheless, investigations at DNA level are necessary in order to better characterize kappa-casein locus in Larbaa breed and to define this species's milk peculiar properties.
Descriptors: dromedary camel, camel milk, characterization of casein fractions, beta casein, beta lactoglobulin, camel milk, kappa casein.

Narmuratova M; Konuspayeva G; Loiseau, G; Serikbaeva, A; Nathalie, B; Didier, M; Faye B. **Fatty acids composition of dromedary and Bactrian camel milk in Kazakhstan.** *Journal of Camel Practice and Research.* 2006; 13(1): 45-50. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The fatty acid composition of milk from dromedary (n=10), Bactrian (n=11) and hybrids (n=3) in Kazakhstan was analysed. The results confirmed the higher quantity of unsaturated fatty acids of camel milk compared to cow milk. Palmitic acid, stearic acid, oleic acid and myristic acid were the most important components of the camel milk fat. As the sampling method included 3 variation factors (species, season, regions) with not more than one sample per case, only general trends were observed. The milk samples collected during summer from bactrian camel in the Caspian region (Atyrau, Aralsk) tended to be richer in long chain fatty acids. On the other hand, the milk samples taken during winter from hybrid or dromedary camels in the southern part of Kazakhstan seemed richer in short chain fatty acids. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, camel milk, camel milk constituents, fatty acids, long chain fatty acids, short chain fatty acids, milk-composition, myristic acid, oleic acid, palmitic acid, seasonality, short chain fatty acids, stearic acid, unsaturated fatty acids, butterfat, Central Asia, hexadecanoic acid, octadecanoic-acid, tetradecanoic acid, Kazakhstan.

Nazifi, S; Saeb, M; Dadvar, L. **Activity of urinary enzymes in Iranian dromedary camels.** *Journal of the Faculty of Veterinary Medicine, University of Tehran*. 2005; 60(3): 235-239. ISSN: 1022-646X. Note: In Persian with an English summary.
Abstract: This study was conducted to determine the reference values of aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase (ALP), lactate dehydrogenase (LDH) and gamma -glutamyltransferase (GGT) in the urine of clinically healthy Iranian dromedary camels (n=50) under identical nutritional and managemental conditions. Urine specimens were lyophilized and the activities of AST, ALT, ALP, LDH and GGT were measured by routine colorimetric methods. Urinalysis and creatinine measurement were also performed. The data were analysed by ANOVA, Duncan's multiple range

test and regression analysis. LDH and GGT had the highest and lowest activities among the urinary enzymes, respectively. The urine pH was observed to be basic. The concentration of creatinine in the urine of Iranian camels was relatively high. Urinalysis revealed that the urine of Iranian camels was normal. There were significant positive correlations observed between GGT activity and urine creatinine ($P<0.05$; $r=0.26$), and ALT activity and specific gravity ($P<0.05$; $r=0.27$).
Descriptors: dromedary camels, urinalysis, urinary enzymes, normal values, kidneys, renal function, alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase, creatinine, enzyme activity, enzymes, gamma glutamyltransferase, lactate dehydrogenase, GOT, GPT, Iran.

Oukessou, M. **A comparative study of renal function in the dromedary and sheep using the single injection technique without urine collection.** *Journal of Camel Practice and Research.* 2005; 12(2): 81-83. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Glomerular filtration rate (GFR) and effective renal plasma flow (ERPF) were compared in dromedaries and sheep using the single injection technique of inulin and rho -aminohippuric acid. The GFR (inulin clearance) and ERPF were significantly lower in dromedaries (1.166 and 6.145 ml/min/kg) than that in sheep (2.220 and 10.300 ml/min/kg). In contrast, the inulin space, which estimates extracellular water volume, as well as the filtration fraction, were similar in the two species. Reproduced with permission of CAB.
Descriptors: dromedary camels, sheep, glomerular filtration rate; kidneys, kidney function, renal function urine testing, species differences, techniques.

Rahim, AGA **The relationship between whole blood selenium (Se) concentration and the activity of the seleno-enzyme, glutathione peroxidase (GSH-Px, E.C.I.11.1.9) in camel (*Camelus dromedarius*).** *Journal of Arid Environments.* 2005; 62(2): 359-362. ISSN: 0140-1963
Abstract The concentration of Se and the activity of the enzyme glutathione peroxidase (GSH-Px) were investigated in the whole blood of camels. Variable concentrations of whole blood Se (0.025-0.043 micro g/ml) and GSH-Px activity (6.32-18.64 EU/ml) were demonstrated in both sexes, with females having significantly higher ($P<0.001$) blood Se concentration and GSH-Px activity than males. A highly significant correlation ($r=0.88$, $P<0.001$) has been demonstrated between whole blood Se concentration and the activity of the enzyme GSH-Px. Reproduced with permission of CAB.
Descriptors: dromedary camels, blood chemistry, enzyme activity, glutathione peroxidase, selenium, sex differences, Sudan.

Rahman, Zia Ur; Cheema, Abdul Majeed; Jaspal, Shaukat Ali Shaukat **Morphological and morphometric profile of camel (*Camelus dromedarius*) pituitary gland.** *FASEB Journal.* 2005; 19(5, Suppl. S, Part 2): A1359-A1360. ISSN: 0892-6638. Note: "Experimental Biology 2005 Meeting/35th International Congress of Physiological Sciences, San Diego, CA, USA; March 31 -April 06, 2005."
URL : http://www.fasebj.org/
Descriptors: dromedary camels, 30 normal camels, males, females, lactating and non-lactating, 3 age groups, anterior pituitary,morphology and morphometric studies, weight, width,

circumference, sexual differences, age differences, cells types increased with age, somatotrophs, thyrotrophs.

Saeed, A. **Serum iron and total iron binding capacity in camel.** *Indian Veterinary Journal.* 2005; 82(10): 1126-1127. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Descriptors: dromedary camels, normal values, blood chemistry, blood serum iron, iron binding capacity, United Arab Emirates.

Sarwar, A; Enbergs, H. **A note on lysozyme activity in the milk of dromedaries during early lactation period.** *Journal of Camel Practice and Research.* 2005; 12(1): 69-70. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: This study was conducted to determine the lysozyme activity during early lactation and the effect of parity, age and sex of the newborn animal on lysozyme activities of camels. 812 milk samples were collected from 29 female camels (11 primiparous and 18 multiparous), 5 to 14 years old and were used in the study. Lysozyme activity was determined by a modified turbidimetric method using Micrococcus lysodeiktikus as substrate. The lysozyme activities in all 812 samples ranged between 2936-7365 U/ml (average=4542+or-1760 U/ml) from days 6-60 postpartum. All camels exhibited a decrease in lysozyme activity by day 11 postpartum. The camels which were multiparous, old (>10 years old) and those which gave birth to male animals had significantly (P<0.05) higher lysozyme activity than the primiparous and young (5-9 years old) animals. Elevated lysozyme activities during early postpartum period in relation to parity and age can be attributed to augmented specific and non-specific immune mechanisms. Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, camel milk, enzyme activity, enzymes, humoral immunity, immune system, lactation, lysozyme, newborn animals, normal values, parturition, multiparous, primiparous.

Sandkc, M; Eren, U; Kum, S. **Alpha-naphthyl acetate esterase activity in the spleen, lymph nodes and conjunctiva associated lymphoid tissues of camels (*Camelus dromedarius*).** *Revue de Medecine Veterinaire.* 2005; 156(2): 99-103. ISSN: 0035-1555 Note: In English with a French summary.
Abstract: This study aims to determine the localization of T lymphocytes in the spleen, lymph nodes and conjunctiva-associated lymphoid tissues (CALT) of adult camels through alpha-naphthyl acetate esterase (ANAE) detection. Spleen, mesenteric lymph nodes and the eyelids were removed from 15 adult camels. ANAE-positive T lymphocytes were observed in all compartments of the lymphoid organs, but mainly in the marginal zones of the spleen, in dense anodular lymphoid tissues of the lymph nodes and in diffuse lymphoid tissues of the CALT. Moreover, macrophages showing intense ANAE positivity were also localized in areas with high T lymphocyte density. Reticular cells surrounding the penicillar arterioles of the spleen or lining the sinuses of lymph nodes also showed a diffuse granular pattern of enzyme activity. The co-localization of these different ANAE positive cellular types (reticular cells, macrophages and T cells) suggest that ANAE participates in the antigen presentation and activation of T lymphocytes. Reproduced with permission of CAB.

Descriptors: dromedary camels, cell mediated immunity, conjunctiva, enzyme activity, esterases, lymph nodes, macrophages, spleen, T lymphocytes, tissue distribution, cellular immunity, T cells.

Sandkc, M; Kum, S; Eren, U. **Develerin (*Camelus dromedarius*) perifer kan lokositlerinde alfa-naftil asetat esteraz aktivitesinin belirlenmesi . [Determination of alpha naphthyl acetate esterase activity in peripheral blood leukocytes of camel (*Camelus dromedarius*)].** *Ankara Universitesi Veteriner Fakultesi Dergisi* . 2005; 52(1): 13-16. ISSN: 1300-0861. Note: In Turkish with an English summary.
Abstract: This study was carried out to determine the alpha naphthyl acetate esterase (ANAE) activity of peripheral blood leukocytes in camels. Heparinized blood samples taken from 13 adult camels were used. ANAE staining was applied at different pH and durations for the determination of ANAE activity. The best reactions against ANAE were obtained for three hours of staining at pH 5.8. The proportion of ANAE positive T lymphocytes was 81.33%. There was a diffuse granular positivity against ANAE staining in monocytes. However, negative reactions were observed in erythrocytes and granulocytes.
Descriptors: dromedary camels, red blood cells, white blood cells, enzyme activity, erythrocytes, esterases, granulocytes, leukocytes, monocytes, staining, T lymphocytes, alpha naphthyl acetate esterase.

Sayed Ahmed, A; Rudas, P; Bartha, T. **Partial cloning and localisation of leptin and its receptor in the one-humped camel (*Camelus dromedarius*).** *Veterinary Journal*. 2005 Sept; 170(2): 264-269. ISSN: 1090-0233
NAL call no.: SF601.V484
Abstract: Based on the studies and results presented here, leptin and its receptor were expressed by adipose tissue, mammary alveolar epithelial cells, liver hepatocytes, and the lining epithelium of the bile duct of the one-humped camel (*Camelus dromedarius).* Our observations support the biological importance of leptin in the mammary gland as well as the likely local effect of leptin on the peripheral tissues. We suggest that there may be an association between hepatic leptin and the lipogenic activity of the liver in the dromedary camel.
Descriptors: dromedary camels, leptin, hormone receptors, adipose tissue, mammary glands, protein synthesis, epithelial cells, epithelium, immunohistochemistry, bile ducts, acclimation, lipogenesis, liver, messenger RNA, nucleic acid hybridization.

Sayed Ahmed, A; Rudas, P; Bartha, T. **Partial cloning and localisation of leptin and its receptor in the one-humped camel (*Camelus dromedarius*).** *Veterinary Journal.* 2005; 170(2): 264-267. ISSN: 1090-0233
NAL call no: SF601.V484
Abstract: Based on the studies and results presented here, leptin and its receptor were expressed by adipose tissue, mammary alveolar epithelial cells, liver hepatocytes, and the lining epithelium of the bile duct of the one-humped camel (*Camelus dromedarius*). Our observations support the biological importance of leptin in the mammary gland as well as the likely local effect of leptin on the peripheral tissues. We suggest that there may be an association between hepatic leptin and the lipogenic activity of the liver in the dromedary camel.
Descriptors: dromedary camels, adipose-tissue, amplification, DNA cloning, gene expres-

sion, genes, hormone receptors, leptin, lipogenesis, liver, liver cells, mammary glands, hepatocytes, lipid formation.

Singhal, K; Madhu ohini; Jha, K; Gupta, PK. **Methane emission estimates from enteric fermentation in Indian livestock: dry matter intake approach.** *Current Science.* 2005; 88(1): 119-127. ISSN: 0011-3891

Abstract: Methane emission from enteric fermentation of Indian livestock was estimated using the dry matter intake approach. Indian livestock emitted about 10.08 Tg methane due to enteric fermentation in the year 1994, in which crossbred cattle, indigenous cattle, buffaloes, goats and sheep and other livestock (mule, yak, camel, donkey, pig, mithun, horse and pony) emitted about 4.6, 48.5, 39, 4.7, 1.8 and 1.4%, respectively. Amongst states, methane emission was highest in Uttar Pradesh followed by Madhya Pradesh and Bihar due to their larger livestock population. Average methane emission for lactating animals was about 53.6 g CH< sub>4</ sub>/kg milk; however, when the methane emission from whole livestock population (productive and non-productive male and female) was considered, the emission value was about 159.9 g CH< sub>4</ sub>/kg milk. Studies for reducing uncertainty in methane emission estimate and mitigating the same from the livestock may be undertaken as it is a major sources category in the agriculture sector.

Descriptors: livestock, methane emission, enteric fermentation, feed intake, livestock, India.

Skidmore, JA. **Reproduction in dromedary camels: an update.** *Animal Reproduction***.** 2005; 2(3): 161-171. ISSN: 1806-9614

Abstract: This review summarizes recent developments in camel reproduction, and it describes characteristics of the ovarian follicular wave cycle and exogenous hormonal control of ovulation and luteolysis. In addition, an account is given of the developments in assisted reproductive technologies in camels such as methods for collection, transfer, and deep-freezing of embryos and semen. Details of recent advances in in vitro maturation and fertilization of camel oocytes are also discussed.

Descriptors: dromedary camels, artificial insemination, blastocyst, cryopreservation, freezing embryos. embryo transfer, embryos, flunixin, GnRH, hormonal control, in vitro culture, in vitro fertilization, luteolysis, oocyte maturation, oocytes, ovaries, ovarian follicles, ovaries, ovulation, pregnancy, pregnancy rate, progesterone, reproduction, sampling, semen, semen preservation, superovulation, synchronization, techniques, endocrine control, gestation, gonadoliberin, gonadotropin releasing hormone, hormonal regulation, meclofenamic acid, sampling techniques.

Tibary, A; Abdelhaq Anouassi; Abdelmalek Sghiri. **Factors affecting reproductive performance of camels at the herd and individual level.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 97-114. ISBN: 1586034731

Abstract: Camels are known to outperform any other species under severe climatic and nutritional stresses. However several biological and pathological factors are involved in overall camel reproductive efficiency. The present paper summarizes the state of knowledge regarding camel reproductive efficiency and the factors affecting it. Among the biological limitations to reproductive efficiency in camels, late onset of puberty in both the male and the female and

long lactation anoestrus are probably the most commonly cited. Age at first parturition and the interval between parturition vary from 36 to 71 months and from 17.5 and 51 months, respectively. The great variability of these reproductive parameters suggests the implication of several other factors that remain unstudied such as nutritional level, breed differences and health. Selection and better nutritional management can improve these parameters. Calving interval is improved tremendously by early weaning. The average number of days between weaning and mating is 7 to 20 days. Pregnancy rate, conception rate or birth rate of females vary from 12 to 85%. The most common components of poor fertility are increased early pregnancy loss and abortion, which may be as high as 40%. Substantial advances have been made in recent years on the methodology of diagnosis (ultrasonography, culture and biopsy) and treatment of infertility and reproductive losses. Studies on the causes of abortion and the methodological approach for the investigation of reproductive losses are still lacking. Male infertility is also poorly studied. The last component of reproductive efficiency in camels is represented by the high neonatal loss ranging from 10 to 90% of the calf crop in some situation. Causes of neonatal losses have been studied to some degree but merit further investigation. Reproduced with permission of CAB.
Descriptors: camels, females, fertility concerns, abortion, age differences, anestrus, conception rate, pregnancy rate, birth rate, reproductive disorders, reproductive traits, selection, diagnosis, infertility, reproductive disorders, reproductive efficiency, reproductive performance.

Wu Run; Chen HaoTai; Liu XiangTao; Xie QingGe. **Cloning and sequence analysis of prion protein gene from *Camelus bactrianus.*** *Chinese Journal of Veterinary Science and Technology.* 2005; 35(12): 969-973. ISSN: 1000-6419. Note: In Chinese with an English summary.
Abstract: Genomic DNA was extracted from peripheral whole blood of four *Camelus bactrianus.* The PrP gene was amplified by PCR using a pair of primers, and then cloned into pMD 18-T vector. Sequencing revealed that the four Camelus bactrianus genes were 768, 768, 792 and 795 bp in length. All the entire PrP coding sequences had the complete ORFs contained within a single exon and were very similar to the published gene sequences of *Camelus dromedarius*. The sequences of PrP gene contained 5 or 6 copies of a short, G-C-rich element which encoded the octapeptide Pro-His-Gly-Gly-Gly-Trp-Gly-Gln or the nonapeptide Pro-Gln/His-Gly-Gly-Gly-Gly-Trp-Gly-Gln. All the amino acid sequences of these genes had an N-terminal signal peptide of 24 amino acids, and a C-terminal signal peptide of 22 amino acids (with the exception of the LT200302 clone which contained a C-terminal signal peptide of 23 amino acids). Comparison of these genes revealed that the sequence identities of nucleotide and their putative amino acid ranged from 91.0 to 100.0% and from 94.2 to 100.0%, respectively. Out of the 133 base substitutions, 107 substitutions were synonymous mutation, and 26 produced amino acid mutation. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, prion diseases, prion proteins, ORFs, amino acid sequences, amino acids, DNA cloning, exons, genes, mutations, nucleotide sequences, open reading frames, signal peptide.

Zainab, AMA; El Belbasi, HI; Hamada, MMZ; Yousef, MMZ. **Some biochemical studies on blood of racing camels.** *Veterinary Medical Journal Giza.* 2005; 53(2(1)): 409-422. ISSN: 1110-1423. Note: "Biotechnology and Animal Wealth Development. Proceedings of the 8th

Scientific Conference, Giza, Egypt, 17-19 April."
Abstract: The aim of this study was to clarify the normal values and the changes of haemogram, some biochemical parameters, and some hormones in both athletic and non-athletic camels. The racing tests were carried out in El-Arish, Egypt, on twenty-seven apparently clinically healthy athletic and non-athletic camels. Blood samples were collected aseptically from jugular vein before and after a 6-km camel race competition. The results showed a significant increase in red cell counts, haemoglobin concentration and haematocrit value in both athletics and non-athletic camels after the 6-km racing, while the derived red cell indices remained without significant changes. Serum concentration of K+ increased significantly in post racing athletics and non-athletic camels, while Na+ increased significantly in non-athletic camels only. HCO< sub>3</ sub>- and Ca2+ decreased significantly while chloride remained without significant changes in both athletic and non-athletic camels. In contrast to other athletic animal species, the serum glucose concentration increased significantly in the post-racing camels. Similarly, there was significant increase in blood lactate, total protein, albumin and globulin in both athletics and non-athletic camels. Nonesterified fatty acids increased significantly in athletic camels while it decreased significantly in non-athletic camels. Furthermore, both serum cortisol and urine vainylmandelic acid increased significantly in post racing camels. In conclusion, racing camels showed haematological, electrolyte, and metabolic responses to such race similar to those reported in other animal species except that of glucose. On comparison, between the athletic and non-athletic camels, the most interesting observations recorded in this study were the following: the high increase in plasma Na+ concentration in non-athletic camels versus no changes in athletic camels; the highly significant decrease in calculated strong ion difference in non-athletic camels versus no change in athletic camels; and while nonesterified fatty acids decreased significantly in non-athletic camels, they increased in athletic camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, racing camels, blood chemistry, blood protein, blood sugar, blood glucose, electrolytes, erythrocyte count, fatty acids, globulins, hematocrit, hematology, hemoglobin, lactic acid, lactate, serum albumin, Egypt.

2004

Abdelhai Guerouali; El Gass, Y; Balcells, J; Belenguer, A; Nolan, J. **Urinary excretion of purine derivatives as an index of microbial protein synthesis in the camel (*Camelus dromedarius*).** *British Journal of Nutrition.* 2004; 92(2): 225-232. ISSN: 0007-1145
Abstract: Five experiments were carried out to extend knowledge of purine metabolism in the camel (*Camelus dromedarius*) and to establish a model to enable microbial protein outflow from the forestomachs to be estimated from the urinary excretion of purine derivatives (PD; i.e. xanthine, hypoxanthine, uric acid, allantoin). In experiment 1, four camels were fasted for five consecutive days to enable endogenous PD excretion in urine to be determined. Total PD excretion decreased during the fasting period to 267 (SE 41.5) micro mol/kg body weight (W)0.75 per d. Allantoin and xanthine+hypoxanthine were consistently 86 and 6.1% of total urinary PD during this period but uric acid increased from 3.6% to 7.4%. Xanthine oxidase activity in tissues (experiment 2) was (micro mol/min per g fresh tissue) 0.038 in liver and 0.005 in gut mucosa but was not detected in plasma. In experiment 3, the duodenal supply of yeast containing exogenous purines produced a linear increase in

urinary PD excretion rate with the slope indicating that 0.63 was excreted in urine. After taking account of endogenous PD excretion, the relationship can be used to predict purine outflow from the rumen. From the latter prediction, and also the purine:protein ratio in bacteria determined in experiment 5, we predicted the net microbial outflow from the rumen. In experiment 4, with increasing food intake, the rate of PD excretion in the urine increased linearly by about 11.1 mmol PD/kg digestible organic matter intake (DOMI), equivalent to 95 g microbial protein/kg DOMI.
Descriptors: dromedary camels, microbial flora indicators, purine metabolism, fore stomachs, rumen, allantoin, bacterial protein, enzyme activity, excretion, hypoxanthine, intestinal mucosa, liver, protein synthesis, purines, uric acid, urine, xanthine, xanthine oxidase, yeasts, intestine epithelium, microflora, protein biosynthesis, purine bases.

Achaaban, MR; Schroter, RC; Forsling, ML; Ouhsine, A. **Salt balance in camels subjected to heat stress and water deprivation stress and water deprivation under two different environmental conditions.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 3-12. ISBN: 8190114123
Descriptors: dromedary camels, salt balance, blood chemistry, urine, urinalysis, dehydration, rehydration, drinking water, environmental factors, heat stress, potassium, sodium, stress factors, stress response, summer, Morocco.

Achaaban, MR; Schroter, RC; Forsling, ML; Ouhsine, A. **Effects of heat stress and dehydration on body water distribution in the dromedary camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 48-57. ISBN: 8190114123
Descriptors: dromedary camels, body water, dehydration physiological, distribution, heat stress, water deprivation; water metabolism.

Achaaban, MR; Forsling, ML; Schroter, RC; Ouhsine, LA. **The neurohypophyseal hormone profiles in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 230-237. ISBN: 8190114123
Descriptors: dromedary camels, pituitary gland, blood chemistry, neurohypophyseal, environmental factors; environmental temperature, hormone secretion, neuropeptides, oxytocin, pituitary, pitressin, posterior pituitary, radioimmunoassay, seasonal variation, vasopressin, antidiuretic hormone, endocrine secretion, hypophysis, Morocco.

Ahmed, MMM; Abead, SM; Barri, MES**. Effect of physiological status on some macromineral profiles in the serum of female camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 103-109. ISBN: 8190114123
Descriptors: dromedary camels, female camels, gestation, pregnancy, lactation, age differences, blood chemistry, trace elements profile, calcium, magnesium, minerals, phosphorus, potassium, sodium, Sudan.

Ahsan Saeed; Hussain, MM; Khan, IA; El Yousuf, RJ. **Effect of age on some serum constituents of camels in United Arab Emirates.** *Indian Journal of Animal Sciences.* 2004; 74(3): 278-280, ISSN: 0367-8318

Abstract: Total protein, albumin, globulin, blood urea nitrogen (BUN), creatinine, cholesterol and triglycerides were studied in 101 camels of different age groups, Group A (1 and 1/2 years upto 2 years old), Group B (2 and 1/2 years of age upto 3 and 1/2 years old) and Group C (4 years old and above). Significant effect of age (groups A, B and C) was observed on globulin (2.12+or-0.03 g/dl, 2.26+or-0.03 g/dl and 2.20+or-0.03 g/dl, respectively), blood urea nitrogen (14.50+or-0.52 mg/dl, 12.70+or-0.44 mg/dl, 17.45+or-0.72 mg/dl, respectively), creatinine (1.78+or-0.03 mg/dl, 1.54+or-0.04 mg/dl, and 2.11+or-0.05 mg/dl respectively) and triglycerides (28.32+or-1.42 mg/dl, 19.35+or-0.89 mg/dl, and 17.40+or- mg/dl, respectively). However, age was non-significant in respect of total protein, albumin and cholesterol levels.

Descriptors: dromedary camels, age groups, blood protein, cholesterol, creatinine, serum albumin, triacylglycerols, United Arab Emirates.

Al Busadah, KA. **Some aspects of calcium and magnesium metabolism in camel calves.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 110-114. ISBN: 8190114123

Descriptors: dromedary camels, calves, parathyroid gland, kidney function, renal function, mineral metabolism, calcium, magnesium.

Al Busadah, KA. **Effect of breed on haemogram of adult dromedary camels in Saudi Arabia.** *Journal of Camel Practice and Research.* 2004; 11(2): 115-118. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: Two breeds of camels, namely Almegaheem and Alshoul, were used for the determination of normal haematological parameters, including haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (RBC), mean corpuscular volume (MCV), mean corpuscular haemoglobin (MCH), mean corpuscular haemoglobin concentration (MCHC), total leukocyte count (TLC) and differential leukocyte count (DLC). It was shown that Hb, PCV, RBC, MCV, MCH, MCHC and TLC values were significantly higher in Almegaheem compared to Alshoul camels. DLC revealed no significant differences between the two breeds. Reproduced with permission of CAB.

Descriptors: dromedary camels,breed differences, erythrocyte count, hematocrit, haematology, hemoglobin, leukocyte count, normal values, cell count, hematocrit, hematology, hemoglobin, Saudi Arabia.

Al Qarawi, AA; El Belely, MS. **Intratesticular morphometric, cellular and endocrine changes in dromedary bulls exhibiting azoospermia.** *Veterinary Journal.* 2004; 167(2): 194-201. ISSN: 1090-0233

DOI: http://dx.doi.org/10.1016/S1090-0233(03)00116-3

NAL call no: SF601.V484

Abstract: Twenty bulls, aged 7-12 years and selected from six dromedary farms were used in this study. Fifteen previously fertile animals were divided into fertile (controls) and infertile groups on the basis of abnormal scrotal contents following palpation and azoospermic

ejaculates collected by electroejaculation. An examination of the clinical and histological findings as well as the testicular patterns of oestradiol-17 beta , testosterone and histamine indicated that three bulls displayed normal ranges comparable to the controls but with bilateral spermatocoeles in the caput epididymides in conjunction with the soft texture of the testicles. Seven bulls showed moderate testicular firmness and springiness, a marked increase in testicular oestradiol-17 beta and histamine concentrations, and increases in surface area, density of mast cells and percentages of seminiferous tubules containing premeiotic spermatogenic cells as well as decreases in testicular testosterone concentrations, surface area of Leydig cells and diameter of the seminiferous tubules. The remaining five infertile animals had small hard testicles, supranormal testicular testosterone concentrations, baseline values of testicular oestradiol-17 beta and histamine, decreased numbers of Sertoli and mast cells, with a predominance (98.2%) of seminiferous tubules containing spermatogonia resting on a thickened tubular basement membrane. The results provide information on the relationship between gonadotrophin, testicular oestrogen, androgens and histamine as well as spermatogenesis in normal and azoospermic dromedary bulls.
Descriptors: dromedary camels, males, camels bulls, male genital diseases, androgens, ejaculation, estradiol, gonadotropins, histamine, histopathology, sperm, testes, scrotum, seminiferous tubules, spermatogenesis.

Al Qarawi, AA. **The chronobiological blood parameter changes as correlated to different traits of *Camelus dromedarius* in Saudi Arabia.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 372-377. ISBN: 8190114123
Descriptors: dromedary camels, breeds and breed differences, phenotypes, acid phosphatase, alanine aminotransferase, aspartate, aminotransferase, blood chemistry, blood proteins, calcium, cholesterol, cholinesterase, creatinine, environmental factors, globulins, lipids, calcium, inorganic phosphorus, iron, nitrogen, seasonal variation, serum albumin, summer, triacylglycerols, uric acid, Got, GPT, Saudi Arabia.

Al Qarawi, AA. **The erythrocyte osmotic resistance of the camel fetus depending on the development.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 355-360. ISBN: 8190114123
Descriptors: dromedary camels, erythrocytes, red blood cells, osmosis, osmotic pressure analytical methods, cytology, embryonic development, embryos, fetal death, fetus, mathematical models.

Al Qarawi, AA. **Phospholipids of the camels (*Camelus dromedarius*) erythrocytes membrane.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 361-363. ISBN: 8190114123
Descriptors: dromedary camels, goats, sheep, species differenced, red blood cells, cell membranes, erythrocytes, phosphatidylcholines, phosphatidylethanolamines, phosphatidylserines, phospholipids, sphingomyelins.

Al Qarawi, AA; Mousa, HM. **The surfactant associated proteins of the camel (*Camelus dromedarius).*** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 516-522. ISBN: 8190114123
Descriptors: dromedary camels, lungs, protein surfactants, albumins, age differences.

Al Qarawi, AA; Mousa, HM. **Lipid composition of pulmonary surfactant from young and adult camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 509-515. ISBN: 8190114123
Descriptors: dromedary camels, lungs, pulmonary surfactant, lipid composition, cholesterol, diphosphatidylglycerols, phosphatidic acids, phosphatidylethanolamines, phosphatidylserines, phospholipids, sphingomyelins, triacylglycerols, age differences.

Al Qarawi, AA; Mousa, HM. **Lipid concentrations in erythrocyte membranes in normal, starved, dehyrated and rehydrated camels (*Camelus dromedarius*), and in normal sheep (*Ovis aries*) and goats (*Capra hircus*).** *Journal of Arid Environments.* 2004 Dec; 59(4): 675-683. ISSN: 0140-1963
Descriptors: dromedaries, sheep, goats, erythrocytes, cell membranes, lipid content, dehydration (animal physiology), starvation, cholesterol, phospholipids, fatty acids, protein content, hemolysis, blood, parasites, stress tolerance.

Al Sultan, SI. **Studies of some normal biochemical parameters of Majaheem breed of camel (*Camelus dromedarius*) in Saudi Arabia.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 94-97. ISBN: 8190114123
Descriptors: dromedary camels, Majaheem breed,blood chemistry, blood plasma proteins, blood serum proteins, blood sugar, normal values, calcium, cholesterol, creatinine, magnesium, sex differences, triacylglycerols, Saudi Arabia.

Alhadrami, GA. **Comparative haematology in the camel calf and adult racing camel (*Camelus dromedarius*)**. In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 378-379. ISBN: 8190114123
Descriptors: racing dromedary camels, camel calves, adult racers, age differences, comparative hematology, erythrocyte count, hematology, hemoglobin, leukocyte count.

Alhendi, AB; Amer, HA. **In vitro physico-chemical examination of ruminal fluids of Saudi Arabian camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 474-481. ISBN: 8190114123
Descriptors: dromedary camels, chemical composition, physicochemical properties, rumen fluids, redox potential, pH, color, odors, consistency, fatty acids, hydrogen sulfide, lactic acid, chloride, nitrogen, rumen digestion, rumen microorganisms, straw, hay, *Hordeum vulgare*, barley, Saudi Arabia.

Amer, HA; Alhendi, AB. **Physical, biochemical and microscopical analyses of camel urine.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 68-74. ISBN: 8190114123
Descriptors: dromedary camels, urine properties, normal values, calcium oxalate, chemical composition physiochemical properties, specific gravity, color, pH, creatinine, diagnostic techniques, chloride, phosphate, phosphates, sodium, thiosulfates, urea, uric acid, urine analysis, thiosulphates.

Aminu Deen; Gorakh Mal; Sahani, MS. **Applicability of commercial progesterone analysis kits standardized on human serum/plasma for progesterone analysis in camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 211-217. ISBN: 8190114123
Descriptors: dromedary camels, progestrone, analytical techniques, assays, blood chemistry, progesterone.

Aminu Deen; Anand Bhati; Sahani, MS. **Trace mineral profiles of camel blood and sera.** *Journal of Camel Practice and Research.* 2004; 11(2): 135-136. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camels, blood and sera profiles, normal values, micronutrients, cobalt, copper, iron, zinc.

Anas Sarwar; Majeed, MA. **Inter-relationships between 30 parameters of blood in normal one-humped camel in summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 385-393. ISBN: 8190114123
Descriptors: dromedary camels, summer season, normal blood values, blood cell counts, erythrocyte count, leukocytes, lymphocytes, monocytes, neutrophils, basophils, eosinophils, serum albumin, blood chemistry, blood proteins, blood glucose, globulins, hematocrit, hemoglobin, chloride, calcium, nitrogen, phosphorus, potassium, sodium, alanine, aminotransferase, aspartate aminotransferase, blood coagulation, blood sugar, cholesterol, globulins, pH, relationships between parameters.

Barsham, MA; El Bagir, NM; Barri, MES. **Haematological and histopathological alterations in sodium thiocyanate-induced hypothyroid camels (*Camelus dromedarius*).** *Pakistan Journal of Biological Sciences.* 2004; 7(2): 197-200. ISSN: 1028-8880
URL: http://www.ansinet.org/pjbs
Abstract: A state of hypothyroidism was induced in camels by the repeated daily intramuscular injection of sodium thiocyanate (3 mg/kg body weight) for 3 consecutive months. A total of 4 adult female camels were used in this study. Blood samples were collected every 3 days for haematological examination, and portions of the thyroid glands were further obtained at slaughter for histological investigation. Administration of thiocyanate resulted in a significant reduction in haemoglobin (Hb) concentration, packed cell volume (PCV), red blood cell count (RBCs) and increased mean cell haemoglobin (MCH), mean cell haemoglobin concentration (MCHC) and mean cell volume (MCV) in camels. The morphological alterations in the thyroid glands were similar to those previously observed in camels living in iodine-deficient areas. Reproduced with permission of CAB.

Descriptors: dromedary camels, thyroid, erythrocyte count, packed cell volume, hematology, hemoglobin, histopathology, hypothyroidism, sodium, thiocyanates, thyroid gland.

Basiouni, GF. **Relationship between concentrations of ovarian steroids and insulin-like growth factor-I in the follicular fluids of the camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 176-180. ISBN: 8190114123
Descriptors: dromedary camels, female camels, estradiol, follicular fluid, hormone secretion, insulin like growth factor, estrogens, ovarian follicles, ovaries, somatomedin C, steroids, testosterone, sulfation factor, sulphation factor.

Bengoumi, M; Moutaouakil, F; Farge, F de la; Faye, B. **Thyroidal status of the dromedary camel (*Camelus dromedarius*): effect of some physiological factors.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 176-180. ISBN: 8190114123
Descriptors: dromedary camels, thyroid function, thyroid function tests, thyroid gland, thyrotropin, thyroxine, triiodothyronine, liothyronine, thyrotropic hormone, adaptation, age differences, blood chemistry, castration, hormone secretion; immunoassay, sex differences, endocrine secretion, thyroid stimulating hormone.

Bengoumi, M; Moutaouakil, F; Farge, F de la; Faye, B. **Seasonal variations of the plasma thyroid hormone concentrations and the body temperature in the dromedary camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 238-244. ISBN: 8190114123
Descriptors: dromedary camels, thyroid gland, plasma thyroid hormone levels, thyroxine, triiodothyronine body temperature, environmental factors, photo period, seasonal changes, environmental temperature and humidity, feed intake, male fertility, Morocco.

Bengoumi, M; Faye, B; Farge, F de la; Olson, WG; Rico, AG. **Clinical enzymology in the dromedary camel (*Camelus dromedarius*). Part - I. Enzyme activities and distribution of AST, ALT, GGT, AP and LDH in liver, kidney, muscle, myocardium and blood.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 281-288. ISBN: 8190114123
Descriptors: dromedary camels, clinical enzymology, enzymes, enzyme activity, kidney, liver, muscle , myocardium, muscle tissue, blood, alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase, bilirubin, blood chemistry, erythrocytes, gamma glutamyl-transferase, lactate dehydrogenase, GOT, GPT, tissue distribution, uric acid, green beans.

Bengoumi, M; Faye, B; El Khasmi, K; Farge, F de la. **Clinical enzymology in the camel (*Camelus dromedarius*). Part - II. Effect of season, age, sex, castration, lactation and pregnancy on serum AST, ALT, GGT, AP and LDH activities.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 289-295. ISBN: 8190114123
Descriptors: dromedary camels, age differences, sex differences, castration effects, pregnancy and lactation effects, seasonal variation, alanine aminotransferase, alkaline phosphatase,

alkaline phosphomonoesterase, aspartate aminotransferase, blood chemistry, enzyme activity, enzymes, gamma glutamyltransferase, lactate dehydrogenase, glutamic pyruvic transaminase, GOT, GPT.

Bengoumi, M; Faye, B; Farge, F de la. **Clinical enzymology in the camel (*Camelus dromedarius*). Part - III. Effect of dehydration on serum AST, ALT, GGT, AP, LDH and urine GGT activities.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 296-302. ISBN: 8190114123
Descriptors: dromedary camels, alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase, blood chemistry, dehydration, enzyme activity, enzymes, gamma glutamyltransferase, lactate dehydrogenase, rehydration, stress, stress factors, stress response, urine, urine analysis, water intake.

Bengoumi, M; Faye, B; Farge, F de la. **Clinical enzymology in the camel (*Camelus dromedarius*). Part - IV. Effect of exercise on serum AST, ALT, GGT, AP, LDH and CK activities.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 303-309. ISBN: 8190114123
Descriptors: dromedary camels,alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase, blood chemistry, creatine kinase, enzyme activity, enzymes, exercise, gamma glutamyltransferase, lactate dehydrogenase, stress response, alkaline phosphomonoesterase, creatine phosphokinase, glutamate pyruvate transaminase, glutamic pyruvic transaminase, glutamyl transferase, GOT, GPT.

Dahlborn, K; Hossaini-Hilali, J; Benlamlih, S. **Changes in fluid balance, milk osmolality and water content during dehydration and rehydration in two lactating camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 195-202. ISBN: 8190114123
Descriptors: dromedary camels, lactation females, camel milk, water metabolism, fluid balance changes, milk composition, milk yield, milk quality, aldosterone, blood chemistry, came milk, dehydration, rehydration, drinking water, osmotic pressure, stress response, vasopressin, antidiuretic hormone, pitressin.

Dycker, C; Lechner Doll, M; Hoffrogge, P; Engelhardt, W.v. **Short-chain fatty acid absorption from the forestomach in camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 791-794. ISBN: 8190114123
Descriptors: dromedary camels, animal nutrition, dietary fat, fat absorption, fatty acids, forestomach, rumen digestion, short chain fatty acids.

El Bab, MRF; Ali, AMA; Alluwaimi, AM; Ahmed, AK; Saad, AH. **Alkaline and acid phosphatase reactivity of the ileal Peyer's patches in camels (*Camelus dromedarius*).**

In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 333-341. ISBN: 8190114123
Descriptors: dromedary camels, acid phosphatase, alkaline phosphatase, enzyme activity,

histochemistry, histoenzymology, intestines, ileum lymph nodes, Peyer patches, acid phosphomonoesterase, alkaline phosphomonoesterase.

El Khasmi, M; Riad, F; Safwate, A; Farh, M; Belhouari, A; Hidane, K; El Abbadi, N; Faye, B; Coxam, V. **Exploration of intestinal absorption and renal excretion of calcium by stable strontium test in camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 653-659. ISBN: 8190114123

Descriptors: dromedary camels, calcium metabolism, intestinal absorption, renal function tests, kidneys, renal excretion, strontium test, analytical methods, blood chemistry, ion balance, phosphorus, renal clearance, renal function.

El Kholy, AF; Gihad, EA; El Banna, HM; El Masooudi, AA. **Observation on rumen protozoa of camel in comparison with other ruminants.** *Egyptian Journal of Nutrition and Feeds*. 2004; 7(1): 33-41. ISSN: 1110-6360. Note: In English with an Arabic summary.

URL: http://www.ejnf.50megs.com

Abstract: Protozoa was counted and identified in the rumen liquor of camel in comparison with goat, sheep and cattle. Three animals from each ruminant species were fed ad lib. on berseem (*Trifolium alexandrinum*) hay as a sole feedstuff. Rumen liquor was collected through a stomach tube before feeding and 3 hr post-feeding. Total protozoal number in camel was 792,000/ml rumen liquor before feeding and increased by 17% post-feeding. Cattle showed similar protozoal number to that of Camel and lower than those of goat and sheep. Camel was the only ruminant showed the presence of *Diplodinium cameli* and this result emphasized the findings of other workers. The other protozoal species observed in the rumen of the experimental ruminants were: *Isotricha prostoma*, *Dasytricha ruminantium*, *Entodinium furca*, *E. bursa*, *E. ecaudatum*, *E. minimum*, *E. simplex*, *E. triacum*, *Epidinium ecaudatum*, *Diplodinium dentatum*, *Buetschlia parva* and *B. neglectum*. The protozoal number and type in the rumen of the different ruminant species were investigated. Reproduced with permission of CAB.

Descriptors: camels, cattle, sheep, goats, ruminant livestock, microbial ecology of the rumen, rumen fluid, rumen protozoa, *Dasytricha ruminantium*, *Diplodinium*, *Entodinium*, *Entodinium bursa*, *Epidinium caudatum*, *Isotricha prostoma*, *Trifolium alexandrinum*.

Elmahdi, IE; Ali, QM; Magzoub, MMA; Ibrahim, AM; Saad, MB; Romig, T. **Cystic echinococcosis of livestock and humans in central Sudan.** *Annals of Tropical Medicine and Parasitology.* 2004; 98(5): 473-479. ISSN: 0003-4983

DOI: http://dx.doi.org/10.1179/000349804225003578

Abstract: New information was collected on cystic echinococcosis in livestock (camels, cattle and sheep) and humans in the central region of Sudan. The livestock data were collected in abattoir-based surveys in the towns of Omdurman, Tamboul and Wad Madani, between 1998 and 2001, and covered a total of 8205 animals. The highest prevalence of infection was found in the camels (44.6% of 242 infected), followed by the sheep (6.9% of 5595) and cattle (3.0% of 2368). Records were made of the sizes of the 1320 hydatid cysts detected in the livestock (907 in sheep, 71 in cattle, and 342 in camels), whether or not each cyst was fertile, and where it occurred in the body of the host. Cysts collected from cattle and

camels where much more likely to be fertile (22% and 24%, respectively) than those from sheep (1%). Camels and cattle therefore appear to be the principal intermediate hosts for Echinococcus granulosus in central Sudan, whereas sheep apparently play a marginal role in transmission. In 2002, as a preliminary assessment of the public health impact of the disease, 300 residents of a rural village 60 km west of Wad Madani were surveyed using a portable ultrasound scanner. Only one (0.33%) of the villagers investigated was found infected. The implications of these finding are discussed in terms of the various strains of E. granulosus and the role of each in human disease.
Descriptors: camels, cattle, sheep, humans, *Echinococcus granulosus,* hydatidosis, disease prevalence, echinococcosis, epidemiology, rural areas, villages, Sudan.

Fahmy , AS; Abadir, NY; Abd Alla, BM. **Purification and characterization of urease from ruminal fluid of camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 310-332. ISBN: 8190114123
Descriptors: dromedary camels,characterization, enzyme activity, enzyme inhibitors, molecular weight, pH, purification, rumen fluid, SDS PAGE, thiols, urease, mercaptans, sodium dodecyl sulfate PAGE, barium, calcium.

Fahmy , AS; Mohamed, SA; Mohamed, TM; Mohamed, MA. **Biochemical studies on the physiology of digestion in camel (*Camelus dromedarius*) fed different forages.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 482-493. ISBN: 8190114123
Descriptors: dromedary camels, camel rumen digestion, rumen metabolism, comparison with different forages, tic beans, faba beans, *Vicia faba;* field beans, broad beans, horse beans, husks, maize, corn, *Zea mays,* wheat and wheat straw, triticum, pH, rumen fluid, enzyme activity, alpha amylase, triacylglycerol lipase, lipase, proteinases, urease, urea, amino acids, ammonia, carbohydrates, cellulose, lipids, proteins.

Faye, B; Bengoumi, M. **Comparative study of trace element status in camel and cow.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 723-727. ISBN: 8190114123
Descriptors: dromedary camels, camel nutrition, cow nutrition, blood chemistry, liver, trace elements status, copper, zinc, mineral metabolism, trace elements supplements, nutrient requirements, species differences, tissue distribution, Morocco, Arab countries.

Faye, B; Bengoumi, M; Viateau, E; Tourret, M; Chilliard, Y. **Adipocyte patterns of adipose tissue in camel hump and kidney.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 819826. ISBN: 8190114123
Descriptors : dromedary camels, camel's hump, body fat, adipose tissue, adiposites, depot fat, tissue distribution and ultrasctucture, kidneys, Arab countries.

Faye, B. **Dairy productivity potential of camels.** *ICAR Technical Series.* 2004; (11): 93-104. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian

and American Camelids, Sousse, Tunisia, 30 May 2004."

Abstract: While it is recognized that the camel has the ability to produce more milk than the cow in similar conditions, camel milk productivity is not well known. Data from the literature are scarce, mainly issued from observations in research stations, and more rarely from pastoral areas where performance monitoring is not common. Elsewhere, the data are not homogeneous among the authors: mean daily yield, total yield per lactation, herd average. Therefore comparisons are not easy. Furthermore, there is a high variability of reported productions which leads to suppose a potential for selection on that criterion. This selection is possible but rarely achieved except in the Soviet Union period for dromedary and Bactrian camels. The world production of camel milk was officially estimated at 1.3 million tons in 2002. However, according to the high level of self-consumption and the individual potential, this production could probably be higher (i.e. 5.4 million tons). The individual production varies between 1 000 and 12 000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is very variable (from 8 to 18 months in general), i.e. longer than that for dairy cattle in similar conditions. Obviously, the feeding and seasonal conditions have an impact on those performances. Some intensified systems found in many places showed good prospects in camel milk production to supply populations from arid lands. Reproduced with permission of CAB.

Descriptors: dromedary camels,lactation, lactation curve, milk production, milk yield, milk yielding animals, performance, USSR.

Gahlot, TK. ***Selected Research on Camelid Physiology and Nutrition***. Published by the The Camelid Publishers, Bikaner, India. 2004; viii + 837 pp. ISBN: 8190114123

Abstract: This 837-page publication is a compilation of previously published papers, primarily written for students, teachers, field veterinarians and scientists seeking information on various aspects of camelid physiology and nutrition. The different topics include: adaptation, stress and dehydration; urine, cerebrospinal fluid, synovial fluid, sweat and blood, as well as camel milk biochemistry; endocrinology; enzymology; haematology; and nutritional and digestive, as well as renal physiology. Reproduced with permission of CAB.

Descriptors: dromedary camels, Bactrian camels, adaptation, camel nutrition, camel physiology, reproductive physiology, stressors, effects of dehydration and sweat glands, camel milk, blood chemistry, cerebrospinal fluid, digestion, endocrinology, enzyme activity, enzymes, hematology, hormone secretion, organ physiology, publications, renal function, stress, stress response, synovial fluid, urine, endocrine secretion, hematology, kidney function.

Gaili, ESE; Al Eknah, MM; Sadek, MH. **Comparative milking performance of three types of Saudi camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 442-447. ISBN: 8190114123

Descriptors: dromedary camels, breed differences, lactation, lactation stage, dairy performance, camel milk production, camel milk yield, camel milk composition, ash, lactose, milk fat yield, milk protein yield, Saudi Arabia.

Guerouali, A; El Gass, Y; Balcells, J; Belenguer, A; Nolan, J. **Urinary excretion of purine derivatives as an index of microbial protein synthesis in the camel (*Camelus dromedarius*)**. *British Journal of Nutrition*. 2004 Aug; 92(2): 225-232. ISSN: 0007-1145

Abstract: Five experiments were carried out to extend knowledge of purine metabolism in the camel (*Camelus dromedarius*) and to establish a model to enable microbial protein outflow from the forestomachs to be estimated from the urinary excretion of purine derivatives (PD; i.e. xanthine, hypoxanthine, uric acid, allantoin). In experiment 1, four camels were fasted for five consecutive days to enable endogenous PD excretion in urine to be determined. Total PD excretion decreased during the fasting period to 267 (SE 41.5) mol/kg body weight (W)0.75 per d. Allantoin and xanthine+hypoxanthine were consistently 86 and 6.1 % of total urinary PD during this period but uric acid increased from 3.6 % to 7.4 %. Xanthine oxidase activity in tissues (experiment 2) was (mol/min per g fresh tissue) 0.038 in liver and 0.005 in gut mucosa but was not detected in plasma. In experiment 3, the duodenal supply of yeast containing exogenous purines produced a linear increase in urinary PD excretion rate with the slope indicating that 0.63 was excreted in urine. After taking account of endogenous PD excretion, the relationship can be used to predict purine outflow from the rumen. From the latter prediction, and also the purine:protein ratio in bacteria determined in experiment 5, we predicted the net microbial outflow from the rumen. In experiment 4, with increasing food intake, the rate of PD excretion in the urine increased linearly by about 11.1 mmol PD/kg digestible organic matter intake (DOMI), equivalent to 95 g microbial protein/kg DOMI.

Descriptors: dromedaries;fasting animals, non-fasting, purine metabolism; microbial protein outflow from forestomachs; urinary excretion; purine derivatives--xanthine, hypoxanthine, uric acid, and allantoin.

Guliye, AY; Yagil, R; Hovell, FDD. **Milk composition of Bedouin camels under semi-nomadic production system.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 428-433. ISBN: 8190114123

Descriptors: dromedary camels, lactation, lactation state, camel milk composition, ash, chloride, dry matter, lactose, milk fat percentage, milk production, milk protein percentage, milk quality, osmotic pressure, parity, pH, nomadism, Israel.

Gurdial Singh; Yashwant Singh; Nagpal, SK. **Cytoenzymic studies on the blood cells of camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 346-350. ISBN: 8190114123

Descriptors: dromedary camels, blood cells, eosinophils, neutrophils, blood chemistry, enzyme activity, enzymes, acid phosphatase, alkaline phosphatase, arylsulfatase, acid phosphomonoesterase lactoperoxidase, peroxidase.

Haider aza; Bhagwat, V; John, A. **Flavin-containing monooxygenase activity in camel tissues: comparison with rat and human liver enzymes.** *Comparative Biochemistry and Physiology C, Toxicology and Pharmacology.* 2004; 139(4): 289-293. ISSN: 1532-0456

Abstract: We previously reported the occurrence of multiple forms of drug metabolizing enzymes in camel tissues. In this study, we demonstrated for the first time, flavin-containing monooxygenase (FMO)-dependent metabolism of two model substrates methimazole

(MEM) and N,N'-dimethylaniline (DMA) by camel liver, kidney, brain and intestine. FMO-catalyzed metabolism in the microsomes of camel tissues was independent of cytochrome P450 (CYP) activity and exhibited a pH and temperature dependence characteristic of FMO enzymes. Use of inhibitors of CYP activities, SKF525A, octylamine or antibody against NADPH-P450 reductase, did not significantly alter the FMO-dependent substrate metabolism. Using MEM as a model substrate for FMO activity, we show that camel liver has an activity similar to that in rat and human livers. MEM metabolism in extrahepatic tissues in camels was significantly lower (60%-80%) than that in liver. Our results suggest occurrence of FMO in camel tissues, with catalytic properties similar to those in rat and human livers. These results may help in better understanding the effects of pharmacologically and toxicologically active compounds administered to camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, humans, rats, liver enzymes, cytochrome-P-450; enzyme activity, enzyme inhibitors, NADPH, species differences, thiamazole, toxicology, dimethylaniline, flavins, methimazole, monooxygenases, NADPH P450 reductase.

Hoffrogge, P; Doll, ML; Dycker, C; Engelhardt, W v. **Motoric activities in the forestomach of camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 457-460. ISBN: 8190114123
Descriptors: dromedary camels, digesta, digestion, fore stomach, physical activity, rumination, stomach motility.

Kappeler, SR; Heuberger, C; Farah, Z; Puhan, Z. **Expression of the peptidoglycan recognition protein, PGRP, in the lactating mammary gland.** *Journal of Dairy Science*. 2004 Aug; 87(8): 2660-2668. ISSN: 0022-0302
NAL call no: 44.8 J822
Abstract: The peptidoglycan recognition protein, PGRP, known as an intracellular component of neutrophils, has been isolated from camel (*Camelus dromedarius*) milk by acid precipitation followed by heparin-sepharose affinity chromatography of the supernatant. The mean concentration in milk was about 120 mg/L. It decreased during lactation by 19% and increased in the event of severe mastitis by 45%. The protein bound to lactic acid bacteria and other gram-positive bacteria with an affinity similar to that reported for the human and murine orthologs, although the isoelectric point of the molecule was distinctly higher at pH 9.02. The N-terminus of mature camel PGRP was determined as NH2-ArgGluAspProPro-CO2H. Calculated and measured molecular masses were both 19.1 kDa, excluding the possibility of posttranslational modifcation or binding of cation ligands. The peptide probably builds a homotrimer at high concentration. The corresponding mRNA was isolated from lactating mammary gland tissue, and 5.3 kbp of the corresponding gene was sequenced. Similarities were found to the camel lactoferrin gene with regard to sites of expression and to the region 5' upstream to the gene.
Descriptors: dromedaries, camel milk, mammary glands, gene expression, binding proteins, antibacterial properties, purification, nucleotide sequences, amino acid sequences, gene expression regulation, mastitis, mammary gland function.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS; Singh, R. **Effect of water restriction on serum aldosterone and cortisol in dromedary camel during winter and summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 129-138. ISBN: 8190114123
Descriptors: dromedary camels, water restriction, dehydration, stress response, effects on serum aldosterone and cortisol, acclimatization, heat adaptation, aldosterone, arid climate, rehydration with drinking water, gluconeogenesis, hydrocortisone, mineralocorticoids, seasonal variation, summer and winter, stress.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Changes in body fluid compartments during dehydration and rehydration in Indian dromedaries (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 58-67. ISBN: 8190114123
Descriptors: dromedary camels, blood volume, body fluids compartments, body water, water metabolism, dehydration physiological, erythrocytes, extracellular fluids, interstitial fluids, winter, rehydration, dehydration, seasonal variations summer, winter, wate deprivation, water intake, water metabolism, India.

Kataria, N; Sareen, M; Kataria, AK; Gahlot, TK; Bhatia, JS; Ghosal, AK. **Studies on cerebrospinal fluid in healthy camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 75-79. ISBN: 8190114123
Descriptors: dromedary camels, albumins, bicarbonates, bilirubin, spinal cord, cerebrospinal fluid, color, chemical composition; chloride, cholesterol, creatinine, diagnostic techniques, electrolytes, globulins, glucose, calcium, magnesium, nitrogen, normal values, pH, physicochemical properties; phosphorus, potassium, sodium, proteins, specific-gravity, spinal cord, water content, dextrose.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS; Singh, R. **Thyroid hormone profile in dromedary camel in winter and summer during water restriction.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 147-155. ISBN: 8190114123
Descriptors: dromedary camels, blood chemistry, thyroid gland, thyroid profile, thyroid hormones, thyroxine, triiodothyronine, seasonal comparison, winter, summer, water restriction effects, fasting, dehydration, drinking water, cholesterol, drinking, drinking water, hormone secretion, metabolism, rehydration, seasonal variation, stress, stress response.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Effect of seasonal dehydration on creatinine clearance in Indian dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 642-652. ISBN: 8190114123
Descriptors: dromedary camels, creatinine, dehydration, heat stress, kidneys, renal clearance, renal function; rehydration, seasonal variation, stress, stress response, water metabolism, India.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Effect of hot and cold ambience on renal clearances of electrolytes in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 634-641. ISBN: 8190114123
Descriptors: dromedary camels, kidneys, kidney function, acid base equilibrium, chloride, dehydration, electrolytes, glomerular filtration rate, ion balance, sodium, potassium, rehydration, renal clearance, renal function, seasonal variation, water metabolism, water intake, cation anion balance, seasonal changes, seasonal fluctuations.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Osmolal and water clearances in dromedary camels during hot and cold ambience.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 628-633. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, water clearances, water intake, water excretion, urine, urination, blood chemistry, body temperature regulation, dehydration, diuresis, drinking, kidney function, glomerular filtration rate, heat stress, osmotic pressure, reabsorption, rehydration, renal function, seasonal variation, stress, stress response.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Effect of season and dehydration on phenolsulphonphthalein fractional clearance in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 616-627. ISBN: 8190114123
Descriptors: dromedary camels, physiological effects of dehydration, rehydration, phenolsulphonphthalein, dyes, kidneys, renal clearance, renal function tests, diagnostic techniques, winter and summer variations.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Some renal functions of Indian dromedary camels with glucose loading during dehydration and rehydration in winter and summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 607-615. ISBN: 8190114123
Descriptors: dromedary camels, renal function, water metabolism, glucose loading, dehydration and rehydration comparison study, water uptake, winter and summer variations, blood glucose, kidney function, glomerular filtration-rate, glucosuria, urination, dextrose.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Intravenous glucose tolerance test (IVGTT) in camels during dehydration and rehydration in winter and summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 607-615. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, glucose tolerance test, blood sugar, physiological dehydration, water deprivation, diagnostic techniques; environmental temperature, water intake, rehydration, relative humidity, summer and winter variations.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Thiosulphate clearance test for determination of glomerular filtration rate in dromedaries.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004;

585-595. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, water restriction, dehydration-physiological, diagnostic techniques, environmental temperatures, glomerular filtration rate, water rehydration, kidneys, thiosulphate renal clearance test, summer and winter variation.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Changes in glomerular filtration rate and effective renal plasma flow during seasonal water restriction in Indian camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 576-584. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, water restriction, kidneys, renal plasma flow, seasonal water restriction, flow, dehydration-physiological, glomerular filtration rate, inulin, urine, renal clearance; winter and summer seasonal variation, India.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Filtered and excreted loads of urea in different climatic conditions and hydration states in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 568-575. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, varying climatic factors, environmental temperatures, dehydration and rehydration, physiological, water intake, kidneys, glomerular filtration, renal clearance, renal function, urea, urination, India.

Kataria, N; Kataria, AK. **Serum calcitonin levels in dromedaries.** *Journal of Camel Practice and Research.* 2004; 11(1): 35-38. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Serum calcitonin levels were determined in 52 adult dromedary camels of either sex belonging to a farmers' stock in a semiarid zone. Calcitonin levels were determined using the RIA technique. The mean values (pg/ml) of calcitonin in healthy males, males with saddle gall or other wounds, non-pregnant females and pregnant females were 80.529+or-10.81, 203.41+or-6.98, 129.33+or-8.78 and 168.34+or-5.78, respectively. The mean value of calcitonin in healthy male animals was significantly (P<=0.05) lower than males having wounds and non-pregnant females. Some minerals related to calcitonin were also determined in the serum samples such as calcium, phosphorus and magnesium. The effect of sex on the mineral values was insignificant (P>0.05). However, the mean values of all the minerals were significantly (P<=0.05) lower in the males having wounds than healthy males. Reproduced with permission of CAB.
Descriptors: dromedary camels, males with wounds, females, pregnant and non-pregnant, gestation, blood serum testing, calcitonin, thyrocalcitonin, calcium, magnesium, phosphorus.

Kataria, N; Kataria, AK. **Use of blood analytes in assessment of stress due to drought in camel.** *Journal of Camel Practice and Research.* 2004; 11(2): 129-133. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A study was carried out to assess the stress due to drought in 83 dromedaries on the basis of variations in the values of some blood parameters. The animals belonged to farmers in India. Cortisol, aldosterone, sodium, potassium, chloride, calcium, phosphorus, proteins, urea, creatinine, vitamin A, red blood cell and white blood cell indices were

measured. It was shown that the mean values of serum cortisol and aldosterone were significantly (P<=0.05) higher in camels belonging to drought-affected areas compared to those in other areas. The drought-affected camels had lowered eosinophil and lymphocyte counts and haemoglobin concentrations. Mean serum vitamin A level and total proteins were non-significantly (P>=0.05) lower in animals in drought-affected areas. The animals did not reveal any bacterial infection in the blood smears. The affected animals also did not show apparent changes in the physical health except pica in a few cases. Reproduced with permission of CAB.
Descriptors: dromedary camels, drought and heat stress effects, blood profile, blood proteins, hematology, aldosterone, retinol, vitamin A1, hydrocortisone, calcium, chloride, creatinine, eosinophils, erythrocyte count, hematology, leukocyte count, lymphocytes, nitrogen, phosphorus, potassium, sodium, India.

Kataria, N; Kataria, AK. **Blood profile during stress in dromedary camel.** *Veterinary Practitioner.* 2004; 5(2): 159-16. ISSN: 0972-4036
Descriptors: dromedary camels, stress response, blood profile while stressed, high environmental temperature as a stressor,aldosterone, cortisol, blood chemistry, sodium, potassium, proteins, hydrocortisone, immunoglobulins, dextrose, hematocrit, hematology, hemoglobin, red and white blood cells, leucocytes, eosinopenia, leucocytes, lymphocytopenia, monocytopenia.

Khadjeh, GH. **Concentration of serum proteins in pregnant and nonpregnant Iranian one-humped camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 91-93. ISBN: 8190114123
Descriptors: dromedary camels, gestation, gamma globulins, blood chemistry, blood proteins, globulins, immunoglobulins, normal values, pregnancy, serum albumin, Iran.

Khadjeh, GH. **Concentration of serum electrolytes in pregnant and nonpregnant Iranian one-humped camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 98-100. ISBN: 8190114123
Descriptors: dromedary camels, pregnancy, gestation, blood chemistry, serum electrolytes, normal values, calcium, sodium, chloride, iron, magnesium, phosphorus, potassium, Iran.

Kinne, J; Nagy, P; Wernery, U. **Serum copper levels in dromedaries after long term exogenous copper supplementation.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 813-818. ISBN: 8190114123
Descriptors: dromedary camels, camel nutrition, mineral supplements, blood chemistry, copper, mineral nutrition, nutritive value, Arab Countries.

Kuria, SG; Gachuiri, CK; Wanyoike, MM; Wahome, RG. **Effect of mineral supplementation on milk yield and calf growth of camels in Marsabit District of Kenya.** *Journal of Camel Practice and Research.* 2004; 11(2): 87-96. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com

Abstract: A study was conducted in Ngurunit and Kargi locations of Marsabit district in Kenya to determine the effect of mineral supplementation on milk yield and calf growth of settlement-based dromedary camels. Two mineral supplements were formulated, one comprised of locally collected, ground bones mixed with locally available natural salt (containing calcium, phosphorus, magnesium, copper, iron, zinc, potassium and sodium) and the other of commercial ingredients (containing the above-mentioned minerals plus cobalt). 59 and 56 camels in early lactation and their calves were selected at Kargi and Ngurunit, respectively. Of these, 22 and 21 camels were randomly assigned the commercial supplement while 12 and 11 were assigned the local supplement at Kargi and Ngurunit, respectively. There were 25 and 23 control camels in Kargi and Ngurunit, respectively. Each dam was individually fed 200 g of mineral supplement daily for 190 days. During the data collection period, milk yield measurements were taken at weekly intervals and calves weighed monthly. It was shown that supplemented camels produced higher (P=0.000) milk yield than controls in Ngurunit (3.2 vs. 2.3 litres/day, respectively). In Kargi, the mean milk yield for supplemented and control camels was similar (P>0.05) at 2.6 litres/day. Calves from the supplemented dams grew faster (P=0.000) than the controls, gaining 441.3 and 424.8 g/day compared with 275.7 and 307.7 g/day for controls in Kargi and Ngurunit, respectively. It is suggested that mineral deficiency exists among the Rendille camels in Marsabit. However, this problem could be reduced by the judicial use of locally available raw material. Reproduced with permission of CAB.
Descriptors: dromedary camels, young camels, milk production, milk yield, animal feeding, trace element deficiencies, mineral deficiencies, feed supplements, growth weight, live weight gain, mineral supplements, calcium, cobalt, copper, iron, magnesium, phosphorus, potassium, salt, sodium, zinc, Kenya.

Lechner Doll, M; Hoffrogge, P; Dycker, C; Zine Filali, R; Engelhardt, W v. **Digesta flow in dehydrated camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 450-452. ISBN: 8190114123
Descriptors: dromedary camels, digesta, feed intake, fore stomach, dehydration, physiological, osmolarity, rehydration, saliva, salivation, stomach motility; water deprivation; water intake.

Maniou, Zoitsa; Wallis, O Caryl; Wallis, Michael. **Episodic molecular evolution of pituitary growth hormone in cetartiodactyla.** *Journal of Molecular Evolution.* 2004; 58(6): 743-753. ISSN: 0022-2844
Descriptors: Cetartiodactyla, dolphins, hippopotamus, giraffe, dromedary camel, sequence of growth hormone, cloned and characterized growth hormone genes, genomic DNA and PCR, 5 exons and 4 introns, camel and alpaca GH identical, giraffe GH similar to ruminants, differs from nonruminant citartiodactyls about 18 residues, rapid evolution indicated.

Mohamed, HE. **The zinc and copper content of the plasma of Sudanese camels (*Camelus dromedarius*).** *Veterinary Research Communications.* 2004; 28(5): 359-363. ISSN: 0165-7380
DOI : http://dx.doi.org/10.1023/B:VERC.0000035015.96444.32
Abstract: A study was undertaken to investigate the variations in the content of zinc and copper in the plasma of Sudanese camels (Camelus dromedarius). A total of 993 Arabi

camels, aged 0.5-8 years, were used to assess the effect of season, age, sex and physiological status on the plasma concentrations of copper and zinc. There was an increase in the concentration of Cu and a decrease in the concentration of Zn in the plasma with age. The concentrations of both Cu and Zn in the plasma were higher in the rainy season than in the dry season. The plasma copper concentrations in pregnant, low-lactating and high-lactating camels were 81.3+or-4.7, 59.7+or-6.1 and 61.3+or-5.5 micro g/100 ml, respectively. The corresponding values for zinc were 51.0+or-8.9, 53.4+or-6.4 and 67.1+or-5.5 micro g/100 ml, respectively. However, there was no effect of sex on the content of these minerals in the plasma. Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, blood chemistry, copper, zinc, normal values, seasonal variation, sex differences, Sudan.

Mohamed, HE. **A note on vitamin A, C and E status in healthy and infected camel calves.** *Journal of Camel Practice and Research.* 2004; 11(1): 65-66. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was undertaken to determine the major causative agents of camel morbidity in the Butana area as well as the plasma levels of retinol, alpha -tocopherol and L-ascorbate in relation to the health status of animals. A field survey was conducted from January to December 2000. A total of 594 camels (*Camelus dromedarius*), aged one month to 1.5 years, were inspected for diseases. Blood and faecal samples were taken for confirmatory tests. Out of the camels examined, 283 were healthy and 311 suffered from various diseases. The prevalence levels of haemonchosis, trichostrongylosis, pneumonia and trypanosomiasis in camels were 32.0, 20.8, 7.8 and 5.7%, respectively. All the infected camels had reduced plasma levels of antioxidants. Trypanosomiasis caused the highest degree of reduction in the plasma antioxidant status of camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, hemonchosis, trichostrongylosis, pneumonia and trypanosomiasis, *Trypanosoma evansi*, etiology, alpha tocopherol, antioxidants, ascorbic acid, disease prevalence, disease surveys, epidemiology, retinol, vitamin E , Vitamin A, vitamin A1, vitamin C.

Mohamed, HE; Beynen, AC. **The effect of starvation on the status of vitamin C in Sudanese camels (*Camelus dromedarius*).** *Folia Veterinaria.* 2004; 48(4): 191-192. ISSN: 0015-5748
URL: http://oldwww.uvm.sk/dept/journals/folia.html
Abstract: We investigated the effect of food deprivation on vitamin C status in Sudanese camels. The camels were found to show a decrease in both plasma and leukocyte ascorbic acid levels only after five days of starvation. In comparison with other dietary-ascorbate-independent animals, camels may show a resistance to starvation-induced lowering of ascorbic acid status. The present data indicate that in camels the urinary excretion of vitamin C is depressed after prolonged fasting. Reproduced with permission of CAB.
Descriptors: dromedary camels, experimental starvation, ascorbic acid status, vitamin C, blood chemistry, leukocytes, urination, Sudan.

Mohamed, SA; Mohamed, TM; Mohamed, MA; Fahmy, AS. **Purification and characterisation of bacterial lipase from camel (*Camelus dromedarius*) rumen fluid.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner,

India. 2004; 245-259. ISBN: 8190114123
Descriptors: dromedary camels, rumen fluid, rumen bacteria characterization, ion exchange chromatography, enzyme activity, isoenzymes, lipase, molecular weight, pH, purification triacylglycerol lipase, isozymes.

Mohamed, Saleh A. **Camel pancreatic carboxylesterase. Purification and properties.** *Bulletin of the National Research Centre* (Cairo). 2004; 29(4): 411-426. ISSN: 1110-0591
Descriptors: camels, pancreas, pancreatic enzymes, carboxylesterase EII, ammonium sulphate precipitation, chromatography, DEAE Sepharose, gel filtration on Sepharose 6 B, characteristics, molecular weight, 50,000. varying activities, inhibitors, hydrolyzing capacity, inhibited by PMSF, serine residue in active site of enzyme.

Mohamed, TM; Salah, HA; Fahmy, AS. **Purification and characterization of bacterial CM-cellulase from camel (*Camelus dromedarius*) rumen fluid.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 260-280. ISBN: 8190114123
Descriptors: dromedary camels, cellulose, characterization, enzyme activity, ion exchange chromatography, isoelectric point, isoenzymes, molecular weight, pH. Purification, rumen, rumen bacteria, rumen fluid, hydrogen ion concentration, isozymes.

Moolchandani, A; Ghosal, AK; Bhatia, JS; Kataria, N; Sareen, M. **Effect of sodium bicarbonate supplementation on physicochemical aspects of saliva in camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 563-564. ISBN: 8190114123
Descriptors: dromedary camels, saliva, salivation, chemical composition, feed supplements, alpha amylase, ammonium nitrogen, sodium bicarbonate, calcium, chloride, electrolytes, inorganic phosphorus, magnesium, nitrogen, nonprotein nitrogen; pH, physicochemical properties, potassium, proteins, urea.

Moolchandani, A; Ghosal, AK; Bhatia, JS; Kataria, N; Sareen, M. **Effect of season on physico-chemical properties of saliva in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 504-508. ISBN: 8190114123
Descriptors: dromedary camels, ssalavation, saliva, seasonal effects, physioco-chemical properties, enzyme activity, alpha amylase, ammonium nitrogen, urea, ash, bicarbonates, calcium, chloride, inorganic phosphorus, nitrogen, nonprotein nitrogen, pH, potassium, proteins, summer and winter seasonal variations.

Mousa, HM; Abbas, AM; Lechner Doll, M; Engelhardt, W v. **Urea recycling in camelids compared with true ruminants at different protein levels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 465-468. ISBN: 8190114123
Descriptors: dromedary camels, camelids, goats, sheep, ruminants, species differences, camelids compared to ruminants, urea recycling, crude protein, dietary protein, diets, nitrogen, nitrogen metabolism, protein intake.

Nabiela, E; Fuhrmann, H; Lechner Doll, M; Sallmann, HP. **Effects of food withdrawal and dehydration on selected blood parameters of camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 1-2. ISBN: 8190114123

Descriptors: dromedary camels, camel nutrition, effects of diet and water restriction, blood chemistry, dehydration, fasting, food restriction, lipids, very low density lipoprotein, lipins-

Naeini, AT; Nazifi, S. **Biochemical and cytological properties of blood and peritoneal fluid in clinically healthy adult camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 123-128. ISBN: 8190114123

Descriptors: dromedary camels, healthy camels, normal values, peritoneum, peritoneal fluid, alkaline phosphatase, amylases, aspartate aminotransferase, blood chemistry, body fluids, calcium, cholesterol, creatine kinase, cytology, eosinophils, red blood cells, erythrocytes, hematology, leukocytes, lymphocytes, neutrophils, triacylglycerols.

Nagpal, AK; Roy, AK; Kiradoo, BD; Raja Purohit; Sahani, MS. **Voluntary feed intake and nutrient utilization of adult female racing camels during exercise and at rest.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 795-800. ISBN: 8190114123

Descriptors: female dromedary camels, racing camels, camel nutrition, feed intake, comparison between exercise and at rest, *Vigna aconitifolia*, camel nutrition, blood chemistry, crude protein.

Nagpal, AK; Saini, N; Roy, AK; Sahani, MS. **Nutrient utilization in camels fed sewan (*Lasiurus sindicus*) grass with or without ardu (*Ailanthus excelsa*) leaves.** *Indian Journal of Animal Nutrition*. 2004; 21(2): 111-114. ISSN: 0970-3209

Abstract: Five young Bikaneri camels (2 years old, 297.2+or-8.6 kg BW) were offered dry chaffed sewan (*Lasiurus sindicus*) grass ad lib in phase I for 30 days followed by supplementation of dry Ardu (*Ailanthus excelsa*) leaves at 1.0 kg/head/day in phase II for 30 days. The DM intake in phase I was 2.19+or-0.22 kg/day or 0.78+or-0.08% BW which increased to 3.36+or-0.12 kg/day or 1.18% BW in phase II. Supplementation also improved (P<0.01) DM digestibility -9.52+or-15.64% in phase I to 45.34+or-1.67% in phase II. Significant (P<0.01) increase in DCP and ME intake was observed on ardu leaves supplementation to sewan grass in phase II. Water intake was also higher in phase II (7.83+or-0.6 litres/day) than in phase I (6.47+or-0.89 litres/day). No significant difference was observed between 2 phases in respect of serum glucose, total protein, albumin, urea, cholesterol, triglycerides, sodium, potassium, chloride, calcium except phosphorus. The results indicated the beneficial effort of tree leaves supplementation on nutrient utilization and growth in young camels fed only grass diet. Reproduced with permission of CAB.

Descriptors: dromedary camels, young animals, growth, animal feeding, *Ailanthus excelsa,Lasiurus scindicus*, blood chemistry, blood serum, crude protein, digestibility, dry matter, feed intake, feed supplements, leaves, metabolizable energy, nutritive value, water intake.

Nazifi, S; Gheisari, HR. **Observations on comparative values of thyroxine (T<ovid:sub>4</ovid:sub>), triiodothyronine (T<ovid:sub>3</ovid:sub>), T<ovid:sub>3</ovid:sub> uptake and free thyroxine index (FTI) in serum and cerebrospinal fluid of camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 156-159. ISBN: 8190114123
Descriptors: dromedary camels, blood brain barrier, blood chemistry, cerebrospinal fluid, hormone secretion, thyroid gland, thyroxine, triiodothyronine, endocrine secretion, liothyronine, thyroid, Iran.

Nazifi, S; Saeb, M; Snaashari, HR. **Using polyacryl amide gel electrophoresis for determination of serum and synovial fluid proteins in clinically healthy camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 80-84. ISBN: 8190114123
Descriptors: dromedary camels, normal values, blood chemistry, blood serum proteins, diagnostic techniques, joints animal, synovial fluid, normal values; proteins, SDS PAGE, synovial fluid.

Nazifi, S; Gheisari, HR. **The influences of thermal stress on serum lipids of camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 27-31. ISBN: 8190114123
Descriptors: dromedary camels, heat stress effects, stress response, serum lipids, blood chemistry, cholesterol, low density lipoprotein, seasonal variations, triacylglycerols, triglycerides, very low density lipoprotein, Iran.

Nazifi, S; Aminlari, M; Mohammadi, AH. **Distribution of gamma-glutamyltransferase activity in the tissues of the camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 342-345. ISBN: 8190114123
Descriptors: dromedary camels, gamma glutamyltransferase enzyme activity, tissue distribution, tissue altra structure, abomasums, heart, kidneys, liver, prostate, reticulum, rumen, spleen, tissue-ultrastructure.

Nazifi, S; Saeb, M; Ebrahimi, M. **Distribution of zinc concentration in the tissues of the Iranian dromedary camel.** *Journal of the Faculty of Veterinary Medicine, University of Tehran.* 2004; 59(4): 351-355. ISSN: 1022-646X. Note: In Arabic with an English summary.
Abstract: The concentration of zinc in different tissues of apparently healthy Iranian dromedary camels was determined. 50 Iranian dromedary camels were used in this study. The concentration of zinc was measured in serum, plasma, red blood cells, white blood cells, hair, liver, kidney (cortex and medulla), abomasum (pylore and fundus), heart (atrium and ventricle), skeletal muscle, urinary bladder and lung of the dromedary camels. The data were analysed statistically by analysis of variance (ANOVA). The difference between the means were statistically estimated by the Duncan multiple range test. All values were expressed in mean (+or-SEM) using a significant level of ($P<0.05$). The concentration of zinc in the RBCs was higher than in the serum, plasma and WBCs ($P<0.05$). The concentration of zinc in different organs was significantly different ($P<0.05$). The highest concentration of zinc was

observed in the skeletal muscle and liver. In contrast, the lowest concentration of zinc was observed in the atrium of the heart. In suspected cases of zinc deficiency or poisoning in camels, the best sample for zinc measurement was the whole blood, particularly the red blood cells. In necropsy cases of zinc deficiency or poisoning, skeletal muscle and liver sampling were preferred. In live camels, biopsy could be taken from muscle and liver tissues. Reproduced with permission of CAB.
Descriptors: dromedary camels, blood, erythrocytes, leukocytes, liver, heart, skeletal muscle, zinc.

Nyang'ao, JMN; Olaho-Mukani, W; Maribei, JM; Omuse, JK. **A study of some haematological and biochemical parameters of the normal dromedary camel in Kenya.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 380-384. ISBN: 8190114123
Descriptors: dromedary camels, hematology, normal values, biochemistry values, blood cell counts, erythrocyte count, leukocytes, lymphocytes, monocytes, neutrophils, basophils, eosinophils, serum albumin, blood chemistry, blood proteins, blood sugar, globulins, hematocrit, hemoglobin, nitrogen, alanine aminotransferase, alkaline phosphatase, aspartate aminotransferase, creatine kinase, lactate dehydrogenase, glutamate-pyruvate transaminase, GOT, GPT, Kenya.

Onjoro, PA; Njoka Njiru, EN; Ottaro, JM. **Status of minerals in the soils, water, forage, blood, milk, urine and faeces of free-ranging camels (*Camelus dromedarius*) in Northern Kenya during the dry season.** *International Journal of Agriculture and Rural Development.* 2004; 5: 121-128. ISSN: 1595-9716
URL: http://ajol.info/index.php/ijard
Abstract: A survey was conducted in Northern Kenya during two dry seasons to assess the concentrations of mineral elements essential for milk production. Samples of soil, water, forage, milk and blood were collected from June to September 2000 and analysed for Ca, P, Mg, Cu and Co. Mineral concentrations ranged as follows; Ca; 20.1-193.0, 85.2-170.0, 50.0-172.7, 22.0-100.0, 116-139.0 and 1.37, P; 17.0-123.0, 10.7-33.1, 28.0-45.0, 13-44.4 and 88.6-90.1, Mg; 3.50-17.0, 8.0-22, 8.3-32.0, 3.0-15.3, 8.9-14.2 and 8.0-14.0, Co; 0.01-0.0.62, 0.04-0.14, 0.38-0.08, 0.06-0.12 and 0.06-0.13, Cu; 0.054-0.715, 0.03-17.0, 0.01-0.39, 0.10-0.23, 0.09-0.18, 0.07-0.15 and 0.05-.14 for forage, blood, faeces, urine and milk respectively. Mineral concentrations in water, and soils are also presented. The water, soil, forage, blood, Milk, urine and faeces from the different herds had varying mineral composition (P<0.5). In blood and urine the locality did not affect the mineral concentrations statistical (P<0.05). The blood and forage Ca and Mg levels are adequate while the levels of P, Co and Cu are below the recommended levels for ruminants. The minerals most likely to be less than required for camel production are P, Co, Cu and K (not measured). The camels seem to be suffering from the imbalance in Ca:P ratios and low Co and Cu in the forages. They may be trying to coop with the imbalance by excreting more Ca in faeces and urine, and concentrating the blood mineral levels. Camel trace mineral requirements may be low but severe deficiency was not observed. Reproduced with permission of CAB.
Descriptors: dromedary camels, free ranging, dry season, forage, mineral content analysis, sampling of body tissues, feces, soil testing, water, forage testing, blood chemistry, urine,

calcium, cobalt, copper, magnesium, phosphorus, milk production, mineral deficiencies, phosphorus, Kenya.

Osman, TEA; Al Busadah, KA. **Effects of age and lactation on some biochemical constituents of camel blood in Saudi Arabia.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 85-90. ISBN: 8190114123
Descriptors: dromedary camels, lactation, age differences, normal values, alkaline phosphatase, alpha amylase, aspartate aminotransferase, bilirubin, blood chemistry, blood proteins, cholesterol, creatinine, nitrogen, serum albumin; triacylglycerols, uric acid, GOT, triglycerides, Saudi Arabia.

Osman, AHK; Sato, S; Maeda, S; Caceci, T. **Apoptosis in the myocardium of the adult dromedary camel: ultrastructural characterization.** *Egyptian Journal of Biology.* 2004; 6: 94-102. ISSN: 1110-6859
URL: http://www.nottingham.ac.uk/~plzfg/EBBSoc/ejb6/10%20Abdel%20Hameed%20et%20al%202004.pdf
Abstract: Apoptosis is a highly regulated mode of cell death that occurs in the absence of inflammation. Light microscopic examination of the myocardium of apparently healthy camels did not reveal evidence of apoptosis in any of the samples. The most common features observed with the transmission electron microscope included: (1) an intact sarcolemma with some bleb formation; (2) nuclear chromatin condensation and margination with nucleolar disruption; (3) mitochondrial swelling and disorganization, accompanied by degeneration or hypercondensation of cristae; and (4) an intercalated disc region with a higher-than-normal mitochondrion/myofibril ratio, or surrounded from both sides by asymmetrically contracted sarcomeres. Apoptotic alterations among the endotheliocytes lining the microvasculature comprised: (1) marked nuclear chromatin condensation and margination; (2) villous blebs on the adluminal plasmalemma, which projected into the lumen; (3) cytoplasmic vacuolation; (4) the presence of intraluminal membrane-bounded vesicles; and (5) occasional pericapillary edema and accumulations of cellular debris. The results of this study indicate that myocardial apoptosis can occur in apparently healthy camels, in the absence of a clear-cut etiology. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel health, heart, myocardium, cardiac muscle, apoptosis, cell death, cell ultrastructure, chromatin, heart mitochondria, myocardium.

Osman, AHK; Yuge, S; Hyodo, S; Sato, S; Maeda, S; Marie, H; Caceci, T; Birukawa, N; Urano, A; Naruse, K. **Molecular identification and immunohistochemical localization of atrial natriuretic peptide in the heart of the dromedary camel (*Camelus dromedarius*).** *Comparative Biochemistry and Physiology Part A Molecular and Integrative Physiology.* 2004 Dec; 139(4): 417-424. ISSN: 1095-6433
Abstract: Atrial and B-type natriuretic peptide (ANP and BNP) are cardiac hormones synthesized and secreted by the myoendocrine cells of the heart. They exert potent actions on body fluid balance. Since various body organs including the heart are under high physiological stress during water and food deprivation in the desert nomads, we intended to perform molecular biological and histological studies of ANP in the heart of the dromedary camel Camelus dromedarius. Initially, we isolated cDNAs encoding ANP from the atrium and

BNP from the atrium and ventricle of the dromedary camel. Putative mature ANP, deduced from the cDNA sequence, was identical to that of human and pig ANP, but the putative mature BNP was more diverse and was most similar to pig BNP (94% identity). Thus, we used antisera raised against human ANP that did not cross-react with pig BNP in the subsequent immunohistochemical studies. The ANP-expressing myoendocrine cells are most concentrated in the right atrium, to a lesser extent in the left atrium, and almost absent in the left ventricle. The immuno-positive cells are scattered uniformly in each region and are characterized by the presence of immunoreactive granular deposits around the nucleus. The left atrium comprises some ramifications of conductive cells (Purkinje fibers), some of which also contained ANP-immunoreactive granules. At the electron microscopic level, myoendocrine cells possessed secretory granules primarily in the perinuclear zone and a well-developed Golgi apparatus. The present study is the first comprehensive report dealing with the molecular cloning and immunohistochemical localization of ANP in the heart of a desert dwelling mammal. Reproduced with permission of CAB.
Descriptors: dromedaries, heart, peptides, immunohistochemistry, ultrastructure, atrial natriuretic peptide, B type natriuretic peptide.

Rahbarizadeh, F; Rasaee, MJ; Moghadam, MF; Allameh, AA; Narang, SA; Sadeghizadeh, M. **Induction of immune response in *Camelus bactrianus* and *Camelus dromedarius* against MUC1 - peptide produced heavy-chain antibodies with efficient combining properties.** *Journal of Camel Practice and Research.* 2004; 11(1): 1-9. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Camelidae are known to possess antibodies devoid of light chains and C< sub>H</sub>1 domains. Antigen-specific fragments of these heavy-chain IgGs (VHH) are of great interest in biotechnology applications. The first example of successfully raised heavy-chain antibodies in Camelus dromedarius and Camelus bactrianus against the MUC1 peptide were reported in this paper. Camels (n=2) were immunized against cancerous tissue and peptide conjugated to bovine serum albumin. Both conventional and heavy-chain IgG antibodies were produced in response to MUC1-peptide. Enzyme linked immunosorbent assays (ELISAs) and Western blotting for MUC1 peptide conjugated to BSA, deglycosylated human milk fat globule membrane (HMFG) and cancerous breast tissues were established to investigate the titre development. Three subclasses of IgG in both camels were separated chromatographically. All three subclasses of IgG in both camels were bound to the MUC1 peptide. This study demonstrated specific in vitro targeting of MUC1 peptide by camel heavy-chain antibodies. It might open new prospective for their future and practical application as tumour-targeting tools, due to their small size and soluble behaviour. Reproduced with permission of CAB.
Descriptors: Bactrian camels, dromedary camels, antibodies, IgG, immune response, immunity, immunization, mucins, cancers, ELISA, Western blot MUC1, neoplasms, peptides.

Raza, Haider; Bhagwat, Shripad V; John, Annie. **Flavin-containing monooxygenase activity in camel tissues: comparison with rat and human liver enzymes.** *Comparative-Biochemistry and Physiology Part C Toxicology and Pharmacology.* 2004; 139(4): 289-293. ISSN: 1532-0456
Descriptors: camels, human, rat, tissues, liver, kidney, brain, intestine, biochemistry, drug

metabolizing enzymes, flavin-containing monooxygenase dependent metabolism, 2 substrates, methimazole, and dimethylaniline.

Razmi, N; Nazifi, S; Motaalleh, G. **Distribution of arginase in tissues of camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 351-354. ISBN: 8190114123
Descriptors: dromedary camels, animal anatomy, arginase, blood chemistry, diagnostic techniques, enzyme activity, liver, liver function tests, tissue distribution, body components.

Rezakhani, A; Habibabadi, SN; Ghojogh, MM. **Studies on normal haematological and biochemical parameters of Turkmen camel in Iran.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 394-399. ISBN: 8190114123
Descriptors: dromedary camels,age differences, hematology, normal values, biochemistry values, blood cell counts, erythrocyte count, leukocytes, lymphocytes, monocytes, neutrophils, basophils, eosinophils, serum albumin, blood chemistry, blood proteins, blood sugar, globulins, hematocrit, hemoglobin, nitrogen, phosphorus, potassium, sodium, Iran.

Saeed, A; Hussain, MM; Khan, IA; Chand, G; El Yousuf, RA. **Effect of sex and age on blood biochemical profile in camel.** *Journal of Camel Practice and Research.* 2004; 11(1): 73-76. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Various blood biochemical parameters (total proteins, albumin, globulin, urea, urea nitrogen, creatinine, iron, calcium, phosphorus, cholesterol and triacylglycerols) were determined in 167 male and female camels of different age groups. The mean values of proteins, albumin, globulin, urea, urea nitrogen, creatinine, iron, calcium, phosphorus, cholesterol and triacylglycerols were 6.1+or-0.4 and 6.1+or-0.4 g/dl; 3.9+or-0.3 and 3.8+or-0.3 g/dl; 2.3+or-0.3 and 2.3+or-0.3 g/dl; 30.6+or-8.2 and 30.0+or-8.2 mg/dl; 14.4+or-3.8 and 14.1+or-3.8 mg/dl; 1.7+or-0.3 and 1.7+or-0.3 mg/dl; 117.4+or-19.7 and 121.7+or-19.4 micro g/dl; 10.7+or-0.6 and 11.0+or-0.4 mg/dl; 6.6+or-0.9 and 6.6+or-1.0 mg/dl; 34.4+or-8.4 and 40.2+or-8.8 mg/dl; and 23.4+or-8.4 and 21.8+or-7.6 mg/dl, in male and female camels, respectively. A significant effect of sex on calcium and cholesterol was observed. Reproduced with permission of CAB.
Descriptors: dromedary camels, sex differences, blood chemistry, blood proteins, serum albumin, cholesterol, creatinine, globulins, calcium, iron, nitrogen, phosphorus, serum albumin, triacylglycerols, United Arab Emirates.

Salwa, MEK; Ali, MS; Samia, HA; Majid, AM. **Physical and biochemical contents of camel, cattle, goat and human urine.** *Journal of Animal and Veterinary Advances*. 2004; 3(9): 587-590. ISSN: 1680-5593
Abstract: A total of 28 urine samples were collected from healthy, male and female, young and adult camels (Camelus dromedarius), cattle, goat and human in Sudan. Samples were physically, chemically, microscopically and biochemically examined for determination of pH, specific gravity, chloride, phosphate, sulfate, bicarbonate, uric acid, urea, creatinine, creatine, total protein, albumin, macro elements (Ca++, Mg+, Na+, K+) and micro elements (Zn++,

Co++). Results were compared with the available literature, and discussed with respect to the peculiar feature of the camel. The results obtained showed that camel urine was superior followed by goat, cattle and human urines. There was pronounced high values in camel urine of potassium, urea and total protein, while sodium, uric acid and creatine were very low as compared to other species.
Descriptors: dromedary camels, young camels, adult camels, goats, humans, comparison study, urine, biochemical and physical description, pH, specific gravity, albumins, proteins, bicarbonates, calcium, chloride, cobalt, creatine, creatinine, magnesium, phosphate, potassium, protein, sodium, sulfate, urea, uric acid, zinc, Sudan.

Sayed Ahmed, A; Rudas, P; Bartha, T. **A leptin hormon expresszioja kulonbozo faju kerodzok egyes szoveteiben.[Expression of leptin hormone in certain tissues of ruminants of different species.]** *Magyar Allatorvosok Lapja.* 2004; 126(10): 589-597. ISSN: 0025-004X.
Note: In Hungarian with an English summary.
Abstract: Besides the thyroid hormones, the leptin hormone plays an important role in the regulation of the overall energy metabolism of the body. Leptin signals from the periphery going to the centre. It informs the central nervous system (CNS) about the size of the lipid depots of the body. In the CNS, anabolic or catabolic processes are triggered which regulate energy expenditure and feed intake. The effects are not limited in controlling the energy balance alone but also in the regulation of reproduction and immune system. Leptin production is not limited to the white adipose tissue, but is also produced in other tissues. In these experiments, the leptin production of large ruminants (Egyptian water buffalo, cow and one humped camel) was examined. Leptin production in the udder of the Egyptian water buffalo and one humped camel did not differ from that of the cow. It was observed that the mammary glands produced leptin, which not only served to increase the milk leptin level, but also helped maintain lactation through leptin receptors located in the epithelial cells of the udder. Based on the results, it is indicated that tissues participating in the production have an autoregulative mechanism through which tissues can be relatively independent of the plasma leptin levels in order to maintain the desired function. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, cows, buffaloes, large ruminants, species comparison, energy metabolism, leptin production, mammary glands, udder tissue, lactation, leptin receptors, adipose tissue, anabolism, catabolism, central nervous system, hormonal control, immune system, lipids, endocrine control, hormonal regulation.

Schmidt Witty, U; Kownatki, R; Lechner Doll, M; Enss, ML. **Binding capacity of camel saliva mucins for tannic acid.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 461-464. ISBN: 8190114123
Descriptors: dromedary camels, salivary glands, saliva, carbohydrates, digestive tract mucosa, glycoproteins, monosaccharides, tannins, saccharides, salivary secretions, binding of tannic acid to mucins.

Seboussi, R; Faye, B; Alhadrami, G. **Facteurs de variation de quelques elements trace (selenium, cuivre, zinc) et d'enzymes temoins de la souffrance musculaire dans le serum du dromadaire (*Camelus dromedarius*) aux Emirats arabes unis.[Variation factors of some trace**

elements (selenium, copper and zinc) and enzyme indicators of muscular fatigue in the serum of camels (*Camelus dromedarius*) in the United Arab Emirates.] *Revue d' Elevage et de Medecine Veterinaire des Pays Tropicaux.* 2004; 57(1/2): 87-94. ISSN: 0035-1865. Note: In French with English and Spanish summaries.

Abstract: The authors investigated the effects of age, sex, breed and physiological status on selenium (Se), copper (Cu), zinc (Zn), creatine-kinase (CPK), alanine aminotransferase (ALT) and aspartate aminotransferase in the dromedary (*Camelus dromedarius*). A total of 240 apparently healthy animals, of which 166 were of the local breed, 68 crossbred, and 6 Sudanese, were randomly selected within a camel population originating from the same herd. The camels were divided into age groups: 2-4 years old, 5-7 years old, and 8 years or older. The camels were fed on alfalfa, a lentil mixture, dates and soya beans, in addition to a concentrate. The study revealed no effect of the breed on measured parameters. The lower Zn level found might have been due to lower Zn contents in the supplemented feed. Significant correlations were obtained between Se and Cu (0.292; P<0.01), Se and Zn (-0.0283; P<0.01). Sex showed a high significant influence on the measured variables, with the exception of ALT. The physiological status influenced all measures, but not CPK. There is a need to integrate these elements and define their precise role in the racing camel. Reproduced with permission of CAB.

Descriptors: racing camels, dromedary camels,age differences, sex differences, alanine aminotransferase, aspartate aminotransferase, creatine phosphokinase, glutamate pyruvate transaminase, glutamic pyruvic transaminase, GOT, GPT, blood chemistry, blood serum, copper, creatine kinase, muscle fatigue, trace, elements, selenium, copper, zinc, United Arab Emirates.

Sehrawat, Sharvan; Singh, Ajit. **Physico-chemical and antigenic characterization of unconventional heavy chain antibodies of Indian desert camel (*Camelus dromedarius* L.)** *Indian Journal of Biochemistry and Biophysics.* 2004; 41(6): 299-304. ISSN: 0301-1208

Abstract: Heavy chain antibodies (HCAbs) of IgG2 and IgG3 subtypes were purified from the sera of Indian desert camel (Camelus dromedarius L.) by ammonium sulphate precipitation, followed by ion-exchange chromatography oil DEAE-cellulose and affinity chromatography on protein A-sepharose and protein G-sepharose, and characterized by SDS-polyacrylamide gel electrophoresis, agar gel immunodiffusion (AGID), counter-immunoelectrophoresis (CIEP), immunoelectrophoresis (IEP), ELISA and immunoblotting. IgG2 and IgG3 were found to have molecular mass 46.77 kDa and 43.65 kDa, respectively by SDS-PAGE under reducing conditions. They migrated in P-region in IEP and could be detected in CIEP, because of being more negatively charged and smaller size. Anti-camel IgG3 cross-reacted in AGID, ELISA and immunoblotting with IgGs of pig and ruminants (cattle, buffalo, sheep and goat), but not with immunoglobulins from horse, dog, guinea pigs, mice, fish, poultry and human. The present findings suggest close antigenic relationship of camels with pigs and ruminants.

Descriptors: desert camel, IgG2, IgG3, heavy chain antibodies, characterization. purification, ELISA, immunologic techniques, immunoelectrophoresis, ion exchange chromatography.

Sekine, J; Nawata, T; Kamel, HEM; Oura, R. **Particle size distribution of digesta in the diverse sites of the alimentary tract of a camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 453-456. ISBN: 8190114123

Descriptors: Bactrian camel, dromedary camels, cecum, colon, rectum, small intestine, crossbreds, crude protein, digesta, digestion, digestive tract, distribution, dry matter, fiber, fibre, fore stomach, stomach, lignin, particle size, rectum, small intestine.

Shaheen, HM. **The effect of feed and water deprivation on ingestive behaviour and blood constituents in camels: comparison with sheep and goats.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 32-47. ISBN: 8190114123

Descriptors: dromedary camels, goats, sheep, species comparison study, feed and water deprivation, effects on ingestive behavior, blood chemistry, blood proteins, blood sugar, body temperature, body weight, dehydration, rehydration, drinking water, fasting, feed intake, feeding behavior, globulins, hematocrit, ion balance, nitrogen, osmotic pressure, potassium, serum albumin, sodium, urea.

Shaheen, HM; Aboul Ela, MB; Yousef, MK; Ahmed, NA. **Comparative erythrocytes morphology in camels, sheep and goats during feed and water deprivation.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 364-371. ISBN: 8190114123

Descriptors: dromedary camels,goats, sheep, deprivation, comparative study, erythrocytes, red blood cell morphology, species differences, restricted feeding, water deprivation.

Tuteja, FC; Dixit, SK; Deen, A; Bhati, A; Sahani, MS. **Mineral antioxidant status in serum and its relationship with somatic cell count in camel milk.** *Journal of Camel Practice and Research.* 2004; 11(1): 59-62. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The mineral antioxidant status in serum of camels was determined as well as its relationship with somatic cell count in camel milk (n=128). Serum Zn, Cu, Co and Fe concentrations were estimated in lactating camels (n=32) having different types of mastitis. The mean serum Zn, Cu and Fe concentrations varied insignificantly between negative, subclinical, nonspecific and clinical groups (P<0.05). However, Co concentrations in these groups were 1.78+or-0.12, 1.34+or-0.18, 1.26+or-0.10 and 0.70+or-0.41 micro g/ml, respectively. Differences were significant among the groups (P< 0.05). The mean serum Zn, Cu, Co and Fe status of animals having SCC up to 2.0, 2.0-5.0, 5.0-10.0 and >10 lactations were 1.30+or-0.60, 1.56+or-0.16, 2.42+or-0.84 and 1.78+or-0.12; 2.37+or-0.32, 1.35+or-0.08, 3.93+or-0.46 and 1.26+or-0.10; 2.45+or-0.51, 0.95+or-0.14, 2.77+or-0.71 and 1.41+or-0.16; and 2.60+or-0.95, 1.25+or-0.25, 3.35+or-1.33 and 1.35+or-0.29 micro g/ml, respectively. The difference in serum Zn, Fe and Co concentrations varied insignificantly among the groups (P<0.05). However, Cu concentration varied significantly among the groups (P<0.05).

Descriptors: dromedary camels, lactation, mastitis, subclinical mastitis, camel milk, anti-

oxidants, blood-serum, disease prevalence, epidemiology, somatic cell count, trace elements, zinc, cobalt, copper, iron.

Wernery, U; Abraham, A; Kinne, J. **Evaluation of blood thiamine (VIT B 1) in racing dromedaries.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 791-794. ISBN: 8190114123
Descriptors: dromedary camels, racing camels, racing performance, acidosis, analytical methods, camel nutrition, blood chemistry, deficiency diseases, diagnosis, diagnostic techniques, HPLC, racing performance, reference works, thiamine, vitamin B 1 vitamin deficiencies, analytical techniques, aneurin.

Yagil, R; Creveld, C van; Abu R'Kaik, G; Merin, U. **Milk "let-down" in camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 409-413. ISBN: 8190114123
Descriptors: dromedary camels, calf suckling, lactation, oxytocin, camel milk, teats, milk ejection let down, milk secretion, milking.

Yang, Yin feng; Tang, Bo; Cao, Gui fang. **The cDNA cloning and sequencing of camel [beta]-defensin caBD-1.** *Acta Veterinaria et Zootechnica Sinica.* 2004 July; 35(4): 357-361. ISSN: 0366-6964. Note: In Chinese with Chinese and English summaries,
Descriptors: Bactrian camels, cDNA, cloning of proteins defensin-caBD-1, protein sequencing.

Yang YinFeng; Tang Bo; Yu XingBang; Cao GuiFang **Examination of expression of camel beta -defensin caBD-1 mRNA in tissues.** *Chinese Journal of Veterinary Science and Technology.* 2004; 34(11): 3-6. ISSN: 1000-6419. Note: In Chinese with an English summary.
Abstract: The total RNA was extracted from the epithelial tissues of camel tongue. The camel beta -defensin-1 (caBD-1) cDNA which was 301 bp in length was cloned by RT-PCR using a pair of primers designed according the reported cDNA conserved sequences of cattle and sheep beta -defensin. In order to examine the organs that possibly expressed caBD-1 mRNA in the camel, another pair of primers, which was expected to amplify a fragment of 203 bp in length, was designed again according to the known caBD-1 cDNA sequence. The expression of caBD-1 mRNA in the different tissues of camel was examined by RT-PCR. The results indicated that the caBD-1 mRNA was expressed in the mucosa of tongue, oesophagus, proventriculus, abomasum, duodenum, jejunum, ileum, proximal colon, distal colon, rectum, trachea, bladder and uterus, but not expressed in the liver, pancreas, lungs, kidneys, spleen, lymph node, ovaries and heart. The expression of the caBD-1 mRNA suggested that caBD-1 might contribute to mucosal host defence in camels.
Descriptors: dromedary camels, epithelial tessuse of the camel tongue, beta defensin-1, CaBD-1 complementary DNA, DNA cloning, gene expression, genes, messenger RNA, cDNA, mRNA.

Arabian: Production

2008

Agab, H. **Camel pastoralism in Butana Region, Northeastern Sudan: constraints and future strategies for development.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 129-133.

Abstract: This article reviews the findings of field research conducted in Butana with special emphasis on the constraints and limiting factors affecting the growth and development of camel husbandry in the region. These constraints included shortages of veterinary services, diseases and animal health ailments, particularly parasitic diseases and camel calf diarrhoea, lack of pasture and water resources, recurrence of drought, security problems and reduced herd fertility. Other constraints included lack of enough capital for investment, labour problem and marketing shortages for camels and camel products. The article also discussed the pathological effects of common diseases encountered among camels in the Butana region, particularly skin and parasitic diseases. Moreover, the effects and drawbacks of these constraints were mentioned and discussed, and some strategies for future improvement of camel husbandry in the region were proposed. Reproduced with permission of CAB.

Descriptors: dromedary camels,etiology, camel diseases, camel husbandry, constraints, factors of production, labor, marketing, pastoralism, pastures, grazing lands, reproductive performance, veterinary services, Sudan.

Al Qarawi, AA; Elmougy, SA. **Seasonality and the melatonin signal in relation to age as correlated to the sexual cycle of the one-humped male camel (*Camelus dromedarius*).** *Biological Rhythm Research*. 2008; 39(2): 131-142. ISSN: 0929-1016

Abstract: Heparinized blood samples were taken from male immature and mature camels of the Sha'alah breed, housed at the University Animal farm, during the rutting and non-rutting period. Other blood samples were also collected from camels slaughtered at defined seasons (summer, autumn, winter and spring) and from the Buraydah slaughter-house. In addition, specimens from the testes were also taken to confirm the difference between the immature and the mature animals during the non-rutting and rutting seasons. The plasma obtained from the collected blood samples was used for estimation of the following hormones, Melatonin (MLT), Follicle Stimulating Hormone (FSH), Leutinizing Hormone (LH), Testosterone and Prolactin (PRL) using the radioimmunoassay technique. Specimens of testes tissue were fixed in calcium formol, processed for histological examination using standard procedures and stained with H&E. The results clearly differentiated the samples as immature and mature during the non-rutting and rutting seasons. Commercially available human radioimmunoassay (RIA) kits for MLT, FSH, LH, testosterone and PRL were adapted for quantitation of these hormones in serum from the one-humped camel (Camelus dromedarius). Serum samples from 40 camels were assayed in order to determine possible differences between various groups in the concentrations of MLT, FSH, LH, testosterone and

PRL in these animals. Among the camels, serum concentrations of melatonin, FSH, LH, testosterone and prolactin reflected age and seasonal differences. Immature camels had overall significantly lower levels in MLT, FSH, LH, testosterone and PRL. Mean FSH and LH levels from confirmed non-rutting (sexually inactive) camels were 0.22+or-0.08 and 0.37+or-0.18 ng/mL, respectively. Although rutting (sexually active) camels had higher FSH and LH levels, the differences were not statistically significant (P less than 0.07). Our observations indicate that these RIAs can reliably detect serum MLT, FSH, LH, testosterone and PLT from camels and represent the first quantitation of melatonin in Camilidae in correlation with FSH, LH, testosterone and prolactin.

Descriptors: dromedary camels, Sha'alah breed, mature males, post slaughter sampling, age differences, FSH, LH, lactogenic hormone, histology, melatonin, estrous cycle, prolactin, seasonality, signal transduction, testes, testosterone, breeding, mammotropin, reproductive cycle.

Al Swailem, AM; Al Busadah, KA; Shehata, MM; Askari, E. **The role of parentage studies in Arabian and Bactrian camel's pedigree verification.** *Journal of Food Agriculture and Environment.* 2008 Apr; 6(2): 280-285. ISSN: 1459-0255

URL: http://www.world-food.net/scientificjournal.php

NAL call no: S494.5.S86 F663

Abstract: Molecular marker technologies have revolutionized the way animal genetics research is conducted. The development of DNA-based genetic markers has had a revolutionary impact on animal genetics. For commercial breeders, DNA typing offers a new and powerful test for collecting information on their animals and to enhance genetic improvement through the selection of high performance progeny. The identification of markers for traits of economic importance will also facilitate the selection of superior animals in the future. The present study was conducted to evaluate the use of RAPD markers in parentage relations and to investigate misidentification paternity frequency in self and cross-species of Arabian and Bactrian camels. Some mating groups and offspring's exhibited a homogeneous pattern indicative of a very low level of DNA polymorphism and the others showed a low heterogeneous polymorphism. Cluster analysis revealed two main clusters of the S (Sufer) group with 89-92% similarity, two main clusters of the M (Magaheem) group and the sire of this group is 76% genetically similar to the dams and their offspring, one main cluster of the G (Shogeh) group and one offspring out of group with 91% similarity. On the other hand, cluster analysis of the B (Bactrian) group revealed three main clusters. Cluster A consisted of dam 2 and 3 pregnant from Arabian sire. Cluster B includes 4 samples and subdivided into 2 subgroups; Subgroup A includes dam 10 Bactrian pregnant from Arabian sire and its offspring, Subgroup B includes mother 12 Bactrian pregnant from Arabian sire and its offspring with 0.84- 0.89 similarity matrix. Cluster C consisted of 3 subgroups; Subgroup A includes Bactrian dam pregnant from Arabian sire and Bactrian dam pregnant from Bactrian sire, Subgroup B includes Bactrian dam pregnant from Arabian sire and the offspring of Bactrian dam and Bactrian sire, Subgroup C includes 3 samples: 2 Bactrian dams pregnant from Bactrian sire and one of their offspring with 0.89-0.92 similarity matrix. Amplification products of the sires, dams and offspring's revealed the presence of common and specific markers. Thus, RAPD-DNA-based markers are powerful tools for parentage studies in camel.

Descriptors: Arabiancamels, Bactrian camels, genetics research, DNA-based genetic markers, parentage studies, cluster analysis, RAPD markers, parentage relations, paternity frequency in self and cross species.

Blancou, J; Parsonson, I. **Historical perspectives on long distance transport of animals.** *Veterinaria Italiana* . 2008; 44(1): 19-30. ISSN: 0505-401X. Note: In English with an Italian summary.
URL: http://www.izs.it
Abstract: Since Roman antiquity, domestic and wild animals have been transported over long distances for purposes as different as improvement of livestock production, food supply, scientific interest, public entertainment, war and numerous other purposes. This long distance transportation was originally limited to the Mediterranean area but, during the Middle Ages extended to the rest of Europe. The conquest of the New World was the first major occasion to transport large numbers of horses and other livestock across the oceans. Domestic animals were necessary for the new colonies and their armies. European expansion to Asia and the Pacific also required the transportation of large numbers of domestic animals. Data, figures and description of the conditions of transport of animals as different as wild beasts, horses, camels, elephants or poultry are reported for each historical period. Reproduced with permission of CAB.
Descriptors: horses, camels, elephants, domesticated birds, wild animals, animals rights, animal welfare, historical records, history, livestock, long distance transport, trans-Atlantic transport.

Chafe, UM; Musa, A; Dogara, B. **Studies of some health aspects of traditional camel management in Northwestern Nigeria.** *Livestock Research for Rural Development.* 2008; 20(2): 20031. ISSN: 0121-3784
Abstract: Structured questionnaires and recorded interviews were used in a survey of 223 camel herds in Sokoto and Kebbi States of North Western Nigeria. The survey was aimed at assessing the health status of the one-humped camel (*Camelus dromedarius*) in the area. From this survey, the commonest disease group was found to be skin diseases (including dermatophilosis, cutaneous ulcers and ectoparasites infestations). Camels in this area were also found to be afflicted with gastrointestinal disorders, respiratory disease and parasitic diseases. 78.9% of the camel owners interviewed use traditional remedies in treating their camels against diseases. The main reason for this, as given by 69.9% of respondents, is the absence of veterinary services in their immediate environment; other reasons include inability to afford veterinary drugs (12.5%) and the belief that modern veterinary drugs are ineffective (10.2%). The average herd size was found to be 3-34 camels at any given time, and the average mortality rate was found to be low (6.4% overall, or 0.67 camels/herd/year). It is concluded that enlightenment campaigns and improved veterinary health care services are needed to increase the number and productivity of camels in Nigeria.
Descriptors: dromedary camels, camel diseases, camel health, camel husbandry, productivity, gastrointestinal diseases; livestock numbers, mortality, death rates, lung diseases, parasitic infestations, parasitoses, respiratory diseases, skin diseases, disease surveys, veterinary services, Nigeria.

Champak Bhakat; Nirmala Saini; Pathak, KML. **Effect of management systems on the performance of dromedary camel calves reared under organized farm condition.** *Indian Journal of Animal Sciences.* 2008; 78(9): 1023-1027. ISSN: 0367-8318

A**bstract:** Camel calves (n=10), 7 to 10 months old, were allotted randomly into 2 comparable groups of 5 each. First group was reared under intensive system of management (ISM) with concentrate supplementation. The second group was reared under semi-intensive system of management (SISM) and allowed daily grazing/browsing for about 6 to 7 h. All animals were offered moth crop residue as manger feeding. Watering was done once daily for all camels in both groups. After 180 days of the trial period, mean body weight and average growth rate were significantly increased in ISM as compared to SISM group. The average total gain was almost double in ISM than SISM. The crop residue intake significantly (P<0.05) varied between groups. Various biometrical parameters, viz. body length, heart girth, height at withers, hump circumference (horizontal), neck length and leg length (fore), were significantly increased in ISM as compared to SISM group. Significant variation was also observed for leg length (hind), foot pad length and width (fore and hind) between groups. Significant and positive correlation between body weight and all biometrical parameters were observed for both groups. The level of triglyceride and total protein significantly increased in ISM as compared to SISM group. Comparatively higher level of urea was found in ISM than SISM. The level of globulin significantly increased in ISM as compared to SISM. The levels of calcium and phosphorus were slightly higher in ISM as compared to SISM. The first in order of behavioural preference were ganthia (*Dactyloctenium aegypticum),* phog (*Calligonum polygonoides*) and khejri (*Prosopis cineraria*) among grasses, bushes and trees, respectively. The total feeding cost per calf for 180 days was more in ISM than in SISM group, whereas the total cost per kg body weight gain was quite less and economical in the former as compared to the later group. Reproduced with permission from CAB.

Descriptors: camel calves, grazing, camel feeding, costs, concentrates, protein feeds, feed intake, feed conversion efficiency, camel husbandry, feeding behavior, feeding preferences, browsing, biometry, body length; body measurements, calcium, phosphorus, globulins, growth rate, heart girth, liveweight gain, triacylglycerols, urea, *Dactyloctenium aegyptium, Calligonum polygonoides*, *Prosopis cineraria*.

Chaudhary, JL; Lokesh Gupta; Tiwari, GS; Rajiv Garg. **Effect of feeding different levels of energy along with groundnut straw (*Arachis hypogea* L.) as a sole diet on nutrient utilization in draught camels.** *Indian Journal of Animal Sciences*. 2008; 78(5): 557-559. ISSN: 0367-8318

Abstract: This study was conducted to determine the effect of groundnut straw (*Arachis hypogea)* with different energy levels on dry matter intake (DMI), digestibility coefficient of the nutrients and nutritive value of feeds and draught of camels. The camels were divided into three groups of three animals each and fed with groundnut straw with three different levels of energy: T1, T2 and T3 animals were fed with ad libitum groundnut straw with 65, 70 and 75% TDN concentrate mixture, respectively. Results revealed that differences in dry matter intake (kg/d) and DCP intake (g/d) were insignificant, but TDNI (kg/d) differed significantly among the treatments. The voluntary water intake and total water intake were significantly higher in Tl when compared with T3. There were insignificant differences in voluntary water intake and total water intake between T2 and T1. The digestibility coef-

ficients of DM and CP were significantly higher in T3 when compared with T2 and T1, but there was insignificant difference between T1 and T2 for DM and CP digestibility. The different levels of energy did not affect the digestibility of OM, CF, EE and NFE. The DCP, TDN, DE and ME values were significantly higher in T3, followed by T2 and T1. The draught (kgf) and power developed (hp) were higher in T3, which was significantly different from T1 and T2. It is suggested that higher energy levels in the diet improve the nutrient utilization and draught performance of camels.
Descriptors: dromedary camels, draft camels, diets, energy content, energy intake, feed intake, feed, groundnuts, *Arachis hypogaea,* nutrition physiology, protein digestibility, comparison study.

Chehma, A.; Faye, B.; Djebar, MR. **Productivite fourragere et capacite de charge des parcours camelins du Sahara septentrional algerien. [Fodder productivity and carrying capacity of the camel pastures of the Algerian northern Sahara.]** *Secheresse*. 2008; 19(2): 115-121. ISSN: 1147-7806. Note: French with an English summary.
URL: http://www.secheresse.info
Abstract: In spite of rough and coercive environmental conditions, certain geomorphological formations offering more or less favourable conditions for survival and proliferation of a characteristic spontaneous flora adapted to desert surroundings exist. These zones, the only available food resource for dromedary, represent the 6 different types of camel pasture (sandy soils, wadis, depressions, hamadas, regs and salty soils) covered in a survey of the Algerian northern Sahara. The sandy soils and the wadis with about 3000 kg of dry matter (DM)/ha were the most productive, with the other fields producing hardly over 100 kg of DM/ha. Concerning seasonal aspects, the best productions were observed in the spring and summer with a total average close to 1200 kg DM/ha. The lowest was in winter with less than 840 kg of DM/ha. Energy and nitrogen production of the different pastures was proportional to the biomass production, where the same trend in the space-time variations was recorded. Sandy soils and wadis gave the highest productions, with spring and summer being the most productive seasons. From this spatial variation in the different pastures studied, the primary productivity in biomass, energy and nitrogen was assessed and it was found that the values of stocking capacities were generally low with an average lower than 1 dromedary/100 ha per year and with highly significant spatial variations. It was always at the level of the sandy soils and wadis that the best stocking capacities were observed with 27 and 18 dromedaries/100 ha annually. Reproduced with permission from CAB.
Descriptors: dromedary camels, arid lands, grazing lands, range pastures, seasonal changes, seasonal fluctuations, biomass production, carrying capacity, dry matter, fodder, energy, fodder, pasture productivity, saline soils, sandy soils, seasonal variation, spatial variation, stocking rate, wadi soils, nitrogen levels, Sahara desert, Algeria.

Darosa, AEM; Agab, H. **A field survey of some camel (*Camelus dromedarius*) production traits and constraints in Butana area, Sudan.** *Assiut Veterinary Medical Journal.* 2008; 54(116): 27-37. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: This field survey was conducted in Butana area, northeastern Sudan, to study the dromedary camel production features, traits and constraints. Most of the palatable and preferred forage plants and trees of camels had disappeared and were replaced by non-palatable

forage plants. The few remaining forage plants preferred by camels were now restricted only to remote inaccessible areas. The classical mode of nomadism among camel herders in Butana area decreased, giving way to settlement as a new emerging mode of camel husbandry. Regarding the level of education among camel herders in Butana region, majority (67.7%) of older herders were illiterate, whereas only 47.8% of the younger herders were illiterate. The average size of the camel herder's families was found to be composed of 7 persons, with 57.2% of the family members being male and 42.8% being female. When the mean total annual income of the camel herding tribes was compared with the mean total annual expenditure, it was found that the income was lower than the expenditure for all the tribes except for the Bawadra group which was the only one practising agropastoralism among all other camel keeping tribes in Butana area. Therefore, the study proposed that agropastoralism characterized by sedentary production system based on land ownership should be encouraged as the most suitable and profitable alternative available for the traditional camel nomads in Butana area of Sudan.
Descriptors: dromedarycamels, feeds, feeding preferences, feed palatability, forage, nomadism, tribes, agropastoral, farming systems, animal husbandry, constraints, education, expenditure, family size, farming systems, income, Sudan.

Das, MM; Singh, KK; Maity, SB. **Water for livestock production.** *Indian Dairyman*. 2008; 60(6): 36-39. ISSN: 0019-4603
URL: http://www.indairyasso.org
Abstract: This article presents the importance of providing livestock with good-quality drinking water. The water consumption requirements of milking cows, growing cattle, bulls, sheep, goats, horses, buffaloes and camels are given. The safety levels of pesticides, potentially toxic nutrients and contaminants in drinking water for livestock are emphasized. The effect of water deprivation on the production and health of livestock is also discussed.
Descriptors: milking cows, growing cattle, bulls, sheep, goats, horses, buffalo, camels, drinking water requirements, water intake, water quality, animal health, animal production, acceptable levels of contaminants and microbes, bacterial count, fecal coliform counts, heavy metals, nitrates, pesticides, toxic substances, toxins, *Microcystis*, India.

Faye B and Y. Sinyavskiy (Editors). ***NATO Advanced Research Workshop on Impact of Pollution on Animal Products, Almaty, Kazakhstan; September 27-30, 2007***. Published by Springer, Dordrecht, Netherlands. 2008. ISSN: 1871-4668 (print). ISBN: 9781402083570
Descriptors: dromedary camels, Bactrian camels, minerals, in milk, heavy metals, and trace minerals, in milk, plant pollutants, water pollutants, pollutants in camel milk, heavy metals and trace elements, in camel tissues, hydrotelluric and industrial fluorosis survey in Mrocco.

Gallacher, DJ; Hill, JP. **Effects of camel grazing on density and species diversity of seedling emergence in the Dubai (UAE) inland desert.** *Journal of Arid Environments*. 2008 May; 72(5): 853-860. ISSN: 0140-1963
DOI: http://dx.doi.org/10.1016/j.jaridenv.2007.10.008
NAL call no: QH541.5.D4J6
Descriptors: camels, grazing, pastoral system, inland desert, forage species, seedling emergence, Dubai.

Homann, S; Rischkowsky, B; Steinbach, J; Kirk, M; Mathias, E. **Towards endogenous livestock development: Borana pastoralists' responses to environmental and institutional changes.** *Human Ecology.* 2008; 36(4): 503-520. ISSN: 0300-7839
URL: http://www.springerlink.com/link.asp?id=101592
Abstract: Borana pastoralists in southern Ethiopia are faced with the challenge of developing more efficient and sustainable use of natural resources. In past decades poorly adapted development interventions and inadequate land-use policies aggravated by population growth have weakened pastoral rangeland management. Ignoring pastoralists' technical and organizational capacities has contributed to progressive land degradation, the erosion of social structures and poverty. The Endogenous Livestock Development concept recognises pastoralists' indigenous knowledge-based strategies and priorities, and uses them as the bases for further development of their production system and social relations, to be utilized, improved and combined with modern technologies. This paper explores the Borana pastoralists' adaptive strategies for improved utilization of natural resources and the manner in which they respond to environmental risk and external influences such as water development and new formal administration. The adaptive responses include controlled integration of crop production and protection of grazing reserves, as well as changing cattle breeding priorities and the adoption of camel husbandry. The pastoralists have started negotiations with the administration to regain control of land utilization by strengthening directives for settlements, land use pattern and extraction rates. To support these initiatives the study recommends that pastoralists and other stakeholders enter into an institutionalized process of negotiation that builds on indigenous knowledge and organizational structures and facilitates validation and implementation of newly generated knowledge.
Descriptors: Borana people, indigenous knowledge, institution building, land use, livestock farming, cattle, breeding priorities, camel husbandry, natural resources, pastoralism, range management, resource management, resource utilization, sustainability, Ethiopia, Abyssinia.

Javadi, SA; Arzani, H.; Salajeghe, A.; Farahpor, M.; Zahedi, G. **A GIS model for determination of water resources suitability for camel grazing.** *Iranian Journal of Range and Desert Research.* 2008; 14(4): 513-523. ISSN: 1735-0875. Note: In Persian with an English summary.
URL: http://www.rifr-ac.ir
Abstract: Proper use from water resources, especially in arid and semi arid rangeland are very important. Water is one of the valuable ecosystem component in rangeland management. In this study for surveying of water suitability, three models including quality model, quantity and distance model made final model. FAO (1991) method (recommended for land capability evaluation) was used for suitability classification. The study was conducted in Halvan region is located in Yazd province, Iran. Results showed that water resources distance and accessibility to water was the most declining factor for suitability. Quality factor was also a limiting factor in part of the study area. Based on these areas, more than 15 km away from water point were not suitable, but less than 6 km were very suitable. Proper distribution of water resources increased water suitability and caused better and monotonous utilization of rangelands. Reproduced with permission of CAB.
Descriptors: camels, arid grasslands, arid lands, geographical information systems, grasslands, grazing, rangelands, semiarid grasslands, water quality, water resources, water use,

geographic information systems, GIS, pasturing, range pastures, water composition and quality, Iran.

Kassahun, A; Snyman, HA; Smit, GN. **Livestock grazing behaviour along a degradation gradient in the Somali region of eastern Ethiopia.** *African Journal of Range and Forage Science.* 2008; 25(1): 1-9. ISSN: 1022-0119

Abstract: Livestock grazing behaviour is poorly understood in the arid rangelands of Ethiopia, resulting in inadequate rangeland management and grazing systems, which are no improvement on the traditional practices by pastoralists. This study aimed at quantifying the influence of rangeland degradation on grazing behaviour of the livestock breeds in the Shinile zone of the Somali region in eastern Ethiopia. Indigenous pastoral knowledge was also used in understanding and ranking the livestock preferences. Six each of male cattle, sheep, goats and camels, with average masses of 200, 35, 30 and 220 kg, respectively, were used and randomly assigned for unrestricted grazing. Species selectivity, grazing time, grazing intensity and number of bites were recorded. Forage mass intake per animal per day was estimated through a simulated feeding trial using *Panicum coloratum* hay. Number, type and abundance of preferred herbaceous species, as well as selectivity by livestock species, declined with rangeland degradation. Grazing time, intensity, number of bites, forage mass and dry matter intake increased with rangeland degradation. Rangeland condition is an important determinant of grazing behaviour of livestock species, an important tool for decision making in improving grazing and rangeland management systems under arid and semi-arid conditions.

Descriptors: cattle, sheep, goats, camels,dry matter, grazing, grazing date, grazing intensity, grazing systems, pasturing, range pastures, land degradation, livestock farming, livestock feeding, pastoral society, pastoralism, range management, rangelands, *Panicum coloratum* hay.

Kassahun, A; Snyman, HA; Smit, GN. **Impact of rangeland degradation on the pastoral production systems, livelihoods and perceptions of the Somali pastoralists in Eastern Ethiopia.** *Journal of Arid Environments*. 2008; 72(7): 1265-1281. ISSN: 0140-1963

URL: http://www.science-direct.com/science/journal/01401963

Abstract: Arid and semi-arid rangelands that serve as the resource basis for the livestock production system known as the pastoral production system in Ethiopia are under enormous threat. These rangelands cover about 62% of the national land area and employs approximately 27% of the population. A survey was conducted in two pastoral weredas (districts; Erer and Aysha) in the Shinile zone of the Somali region, with the aims of assessing the status and trends of rangeland degradation, and understanding the impact on livelihoods and perceptions of the pastoralists over a 60-year period (1944-1974 and 1974-2004). The year 1974 was taken as a reference due to the severe drought in the Horn of Africa. Three villages per wereda, 50 households per village and one elder pastoralist (70-75 years old) per household were randomly selected. The sample of elders consisted of 30% women and 70% men, who were interviewed using questionnaires and open discussions. The results revealed that drought, aridity and rangeland degradation have increased over time due to environmental degradation and mismanagement of rangeland resources. Changes in vegetation ecology have drastically ($p<0.05$) altered the livestock species composition in favour of camels and small ruminants rather than cattle. This has also influenced the planning and preference of pastoralists for different types of livestock. Poor and very poor households have emerged, and the

below-medium wealth rank has disappeared, showing that poverty has increased over time. Traditional coping mechanisms are reported to be failing due to increasing environmental and rangeland degradation and lack of national policies to minimize or solve the problems. These findings offer a new perspective for communal rangeland management research, particularly in arid and semi-arid areas. Reproduced with permission of CAB.
Descriptors: cattle, dromedary camels,arid lands, grazing lands, range pastures, pastoral people's attitudes, drought, land degradation, pastures, rangelands, semiarid zones, Ethiopia, Abyssinia.

Megersa, Bekele; Regassa, Alemayehu; Kumsa, Bersissa; Abunna, Fufa. **Performance of camels (*Camelus dromedrius*) kept by pastoralists with different degrees of experience in camel keeping in Borana, Southern Ethiopia.** *Animal Science Journal*. 2008 Aug; 79(4): 534-541. ISSN: 1344-3941
DOI : http://dx.doi.org/10.1111/j.1740-0929.2008.00560.x
NAL call no: SF1.A542
Abstract: The aim of the present study was to investigate the performances of camels kept by pastoralists with different degrees of experience in camel production. The study was conducted on 60 selected camel herds twice a year; during wet and dry seasons of 2003 and 2004 in Borana, Southern Ethiopia. The average ages at first parturition and calving intervals of breeding females were 68.1 pl 0.5 and 25.5 pl 0.4 months (LSMean pl SE), respectively. Age at first parturition was significantly reduced by use of veterinary services, while variation was not observed among Borana, Guji, Gabra and Somali herds. Calving intervals were significantly shorter ($P < 0.05$) in Borana (24.8 pl 0.6) and Guji (24.5 pl 1.5) than Somali herds (27.0 pl 0.5). Calving intervals were also prolonged ($P < 0.05$) by fixing breeding time. Annual calving, abortion and calf mortality rates were similar for the four populations and averaged 37.3%, 9.3%, 20.3% in 2003, and 41.3%, 8.2%, 14.9% in 2004, respectively. The overall mortality rate was significantly higher ($P < 0.05$) in Borana (10.0 pl 2.1) than in Gabra herds (4.2 pl 0.8). However, mortality was not statistically different for use of veterinary services and other managemental practices. The study showed an increase in annual herd growth by 5.7% in 2003 and 11.6% in 2004 with similarity of herd dynamics between the two years. Daily milk yield differed significantly ($P < 0.05$) depending on veterinary services, watering frequency and the season (7.6 L during wet and 4.3 L during dry season). Similarly, milk yield was significantly higher ($P < 0.01$) in Somali herds than in Borana and Gabra herds. In conclusion, the study revealed that some production and reproduction performances in camel herds have showed significant variation with varying levels of herding experience and veterinary services. This may suggest performance in pastoral camels can be enhanced with learning more about and using traditional management practices as well as improving animal health service delivery.
Descriptors: camels, pastoral system experiences, herd dynamics, pastoral ethnics, production and reproduction performances, milk yields, variables, watering, veterinary care, Borana and Gabra herds, Ethiopia.

Menczer, K. **Africa.** In: Appleby, MC; Cussen, V; Garces, L; Lambert, LA; Turner, J. *Long Distance Transport and Welfare of Farm Animals.* Published by CABI, Wallingford, UK. 2008; 182-217. ISBN: 9781845934033

Abstract: This account of long-distance transport in Africa covers North Africa, East Africa, Southern Africa and West Africa. The chapter examines the long-distance transport of cattle, goats and sheep throughout Africa and, to a lesser extent, the transport of horses, donkeys and camels. Pigs and chickens are often produced in relatively close proximity to the place of slaughter, and therefore, are less likely to be subject to long-distance transport. The main long-distance transport routes in Southern Africa are from Namibia, via Botswana to South Africa (by road 2-5 days, with distances covered varying from 1000 to 2000 km) and the export of animals by sea from ports in South Africa and Mozambique to Mauritius (by sea 7-10 days). In West Africa, long-distance transport can take several days, with routes from Niger and Mali to Togo, Benin, Ghana and Nigeria the longest, taking, on average, 3-6 days, and covering up to 2000 km. However, the number of days in transit depends on the number of stops at markets, and can take much longer than 6 days. In East Africa, one of the longest routes is in Southern Sudan where the journey can take 3 days from Rumbek to the Uganda border; however, cattle often travel through Uganda from there, another 2-3 days. In North Africa land transport can be 7-9 h. The exception is for sheep imported from Australia. Sheep are shipped directly on vessels from Australia to the Suez port in Egypt and can take about 3 weeks. Egypt imported annually around 50 000-100 000 head of sheep. Trekking is a common means of transporting livestock in Africa, and in East Africa some of the longest treks are recorded - about 75 days. These Southern, West and East African long-distance routes are described further in this chapter. The chapter discusses the cultural, religious and economic factors influencing the livestock trade in Africa; describes transport by trekking, trucking, rail and ship; and the welfare issues associated with each type of transport. Trucking and trekking are the most common means of long-distance transport in Africa. Animal welfare issues common to long-distance transport include poorly developed and degraded infrastructure; lack of enforcement of national legislation, where legislation governing livestock transport exists; and inhumane handling of livestock throughout the production chain. Specific cases of good practices, poor practices and opportunities to impact long-distance transport are presented. A good practice is illustrated by South Africa, where NGOs are having an impact on livestock transport and slaughter - providing oversight of the livestock industry. Poor practices include cruel treatment of animals during loading, unloading, transport and slaughter. Cruel treatment includes gouging out eyes before slaughter, using fire, twisting tails and beating exhausted animals to load and offload animals on to trucks and slaughtering animals with cuts across the throat that are incomplete and slaughtering in front of other animals. Opportunities include the potential for international trade in meat and other livestock products, which, if the importing market demands it, could encourage improved production practices, including more humane transport and slaughter; and the increasing presence and strength of animal welfare NGOs, which can have a positive impact on livestock handling and transport.
Descriptors: cattle, donkeys, asses, sheep, pigs, horses, poultry, domesticated birds, goats, dromedaries, animal welfare, legislation, livestock, livestock transporters, long distance transport of animals, livestock trailers, Africa, East Africa, North Africa, Southern Africa, West Africa.

Phillips, CJC. **The welfare of livestock during sea transport.** In: MC Appleby; V Cussen; L Garces; LA Lambert; and J Turner. *Long Distance Transport and Welfare of Farm Animals.* 2008; 137-156. ISBN: 9781845934033

Abstract: Large numbers of livestock are reared for transport overseas, and the long duration of the journey and the changes in the animals' environments provide special challenges compared to short-distance transport. A description is provided of the most common methods of transporting live animals by sea for slaughter internationally. The biggest exporter in the world is Australia and the main markets are South-east Asia and the Middle East. The most common livestock transported are cattle and sheep, but goats, camels, buffaloes, pigs and horses may also be transported alive. It is emphasized that multiple factors impacting on animal welfare are involved before, during and after the ship voyage; these include mustering, shearing (in the case of sheep), transport to feedlots and several changes of environment that can cause fear and anxiety. Information on the welfare of exported cattle and sheep on transport ships from Australia comes mainly from a survey of expert opinion completed in 2005. This found that the major stressors on ship were believed to be clinical diseases, especially inappetence and salmonellosis in the case of sheep, heat stress, high stocking density and high ammonia levels. The reported mortality rate is considerably greater for sheep than cattle, particularly due to failure to eat in the sheep, but has tended to decline for both species over the last 5 years. Other potential stressors, about which little is known, include noise, motion sickness, changes in lighting patterns and novel environments. Reproduced with permission of CAB.

Descriptors: buffaloes, cattle, dromedaries, horses, pigs, sheep, goats, livestock, animal welfare, transport of animals, livestock transporters, heat stress; livestock mortality, sea transport, stocking density, stocking rate, death rates, Australia.

Prasad, Shiv; Singh, Rajendra. **Population dynamics of pack animals in India**. *Indian Veterinary Journal*. 2008; 85(10): 1090-1093. ISSN: 0019-6479

URL: http://www.indvetjournal.com

NAL call no.: 41.8 IN2

Descriptors: pack animals, horses, ponies, donkeys, camels, mules, demographic structure of pack animals, replacement of animals, by tractors, projected future populations of pack animals, India.

Rousseau, G; Guintard, C; Abadie-Reynal, C. **La gestion des animaux a Zeugma (Turquie): etude des restes fauniques du Chantier 9 (epoques Hellenistique, Romaine, Byzantine et Islamique). [Animal use at Zeugma (Turkey): study of faunal rests from French trench 9 (Hellenistic, Roman, Byzantine and Islamic periods).]** *Revue de Medecine Veterinaire.* 2008; 159(5): 251-275. ISSN: 0035-1555. Note: In French with an English summary.

Abstract: This study of the faunal rests from French trench 9 (from the 3rd century B.C. to the 10th century A.D.) of the Zeugma site in Turkey analysed 6837 rests for a total weight of 36 833 g. 36% of the rests were determined. The meat consumption of the inhabitants from this quarter of the Zeugma contained almost all domestic mammals (96%). Bovines and pigs represented the major source of meat. Bovines may have played different roles and were slaughtered at different ages, whereas pigs were only bred for meat and were consequently slaughtered at maturity. Caprines (sheep and goats) were a secondary source of meet without

being negligible; their breeding aimed to obtain other products like milk or textile fibres. Hunting (red deer, roe deer, boar and hares) was also an additional source of meat. Birds and mollusc rests were few, therefore, it is not possible to conclude about their place in the nutrition of Zeugma inhabitants. This study also showed the existence of bones from probably non consumed species as horses, donkeys, mules, dromedaries and domestic carnivores. Reproduced with permission of CAB.
Descriptors: archeological domestic animals, 3 rd Centry BC to 10 th Century AD, livestock, birds, *Capreolus capreolus*, goats, cats, cattle, *Cervus elaphus,* red deer, dogs, donkeys, dromedary camels, hares, horses, mules, asses, Mollusca, wild pigs, sheep, animal fibers, animal tissue remains, bones, history, meat, milk, Turkey.

Seboussi, Rabiha; Al Hadrami, Ghaleb; Askar, Mostafa; Faye, Bernard. **Effect of excess selenium on dromedary camel in the United Arab Emirates.** In: B Faye and Y Sinyavskiy (Editors). *NATO Advanced Research Workshop on Impact of Pollution on Animal Products, Almaty, Kazakhstan; September 27-30, 2007*. Published by Springer, Dordrecht, Netherlands. ISSN: 1871-4668 (print). ISBN: 9781402083570
Descriptors: dromedarycamel, selenium, metabolism and toxicity, enzyme glutathione peroxidase (GSH-PX), selenium intolerance levels, 3 experimental levels, symptoms, alopecia, abnormal movement and posture, breathing difficulties, prostration, diarrhea, weight loss, neuronal alterations.

Seboussi, R; Faye, B; Alhadrami, G; Askar, M; Ibrahim, W; Hassan, K; Mahjoub, B. **Effect of different selenium supplementation levels on selenium status in camel.** *Biological Trace Element Research.* 2008; 123(1/3): 124-138. ISSN: 0163-4984
Abstract: Twelve female camels divided into three groups received, after a 2-week adaptation period, an oral Se supplementation (0, 2, and 4 mg, respectively) under sodium selenite form for 3 months. Feed intake was assessed daily, blood samples and body weight were taken on a weekly basis, and feces and urine samples were collected every 2 weeks up to 1 month after the end of the supplementation period. The Se concentration in serum was increased significantly in supplemented groups. The maximum level was observed in the period of supplementation in the camel receiving 4 mg (492.5 ng/mL), which was fourfold higher than the value at the beginning of the trial (126 to 138.5 ng/mL according to the groups). The selenium concentration increased significantly in urine and feces but to a lesser extent. A similar trend was observed with glutathione-peroxidase (GSH-Px) values varying between 8.4 and 96.5 IU/g Hb. However, no difference occurred between the two groups receiving 2 or 4 mg Se at the supplementation period. Vitamin E (mean 1.13+or-0.61 micro g/mL with range 0.27-3.09) did not change significantly. Significant correlations were reported between serum Se, GSH-Px, fecal, and urinary excretion or concentration. Reproduced with permission of CAB
Descriptors: dromedary camels, females, feed formulation, feed intake, selenium oral feed supplement, vitamin E, glutathione peroxidase, liveweight gain, urine and fecal testing.

Shah, MG; Reissmann, M; Qureshi, S; Schwartz, J. **Evaluation of six camel breeds for heterozygocity through restriction fragment length polymorphism.** *Pakistan Veterinary Journal.* 2008; 28(1): 13-16. ISSN: 0253-8318

Abstract: In the camel tyrosinase gene, a restriction site provoked by the T variant was used in a special restriction fragment length polymorphism analysis (PCR-RFLP) for genotyping of animals from six different Pakistani camel breeds (Marecha, Dhatti, Larri, Kohi, Campbelpuri and Sakrai). For this purpose, four new primer pairs were designed for sequencing the coding region of exon 1 of the tyrosinase gene. PCR reactions were carried out in a total volume of 25 micro L using 100 ng genomic DNA to amplify a 474 bp fragment at 56 degrees C. A SNP (T/C) at 200 bps was found and exploited with a Dde I restriction enzyme that resulted in three different genotypes i.e. TT, TC and CC in each studied camel breed. Significant differences in the genotype frequency between the breeds were recorded. The Sakrai breed showed a distinctly higher frequency of heterozygous animals compared to Marecha, Dhatti, Larri and Kohi breeds. Our new designed primers could be used for genotype screening of other camel breeds. However, for understanding the contribution of tyrosinase gene and its antagonist i.e. agouti in the coat colour production, complete sequence of the gene is imperative.
Descriptors: camels; breed differences; breeds: Marecha, Dhatti, Larri, Kohi, Campbelpuri, Sakrai; coat color; enzymes; genes; heterozygosity; nucleotide sequences; PCR; RFLP; restriction fragment length polymorphism; Pakistan.

Shehu, BB; Nasiru, JI; Mahmud, MR; Laseini, A; Saidu, SA. **Carotid occlusion and cerebral infarction from camel bite: case report.** *East African Medical Journal.* 2007; 84(11): 550-552. ISSN: 0012-835X
URL: http://www.eamj.com
Abstract: A 30-year-old farmer was bitten by his camel on the left side of the neck. He suffered immediate loss of consciousness but recovered three days later with right-sided hemiplegia and complete aphasia. He bled minimally from the neck. CT scan of the brain and carotid Doppler ultrasonography confirmed left parietal lobe infarction and partial occlusion of the left carotid artery respectively. He was managed conservatively with physiotherapy and low dose aspirin. At six months of follow up, his speech remains slurred but comprehensible and is able to walk with a walking stick. Reproduced with permission of CAB.
Descriptors: dromedary camel, farmer received a camel bite in neck, human case study, carotid artery occlusion, parietal lobe infaction, brain injury, clinical aspects, Nigeria.

Shuiep, ES; El Zubeir, IEM; El Owni, OAO.; Musa, HH. **Influence of season and management on composition of raw camel (*Camelus dromedarius*) milk in Khartoum State, Sudan.** *Tropical and Subtropical Agroecosystems*. 2008; 8(1): 101-106. ISSN: 1870-0462. Note: In English with a Spanish summary.
URL: http://www.uady.mx/~veterina/publicaciones/journal/2008-1/151-camel-SN.pdf
Abstract: The influence of seasons (winter and summer) on chemical composition of raw camel milk within two management systems in two different locations around Khartoum State, Sudan was investigated. Camel milk samples (n=112) were collected from Eastern Nile (semi-intensive system) and Western Omdurman (traditional system) using the same procedure for milk sampling. The two locations were approximately of 100 Km distance apart. Titratable acidity and major components of milk were determined. Total solids, lactose and titratable acidity were higher in Eastern Nile samples (P<=0.05), while fat was higher in Western Omdurman (P<=0.01). Non-significant differences were obtained between locations

in ash and protein content. Summer samples revealed significantly higher protein content and titratable acidity in Eastern Nile, whereas in winter all components were higher than those examined in summer in both locations. The high water content in summer samples negatively affected camel milk components compared to winter samples. The influence of season was higher than that reported for management. Feeding of high energy diets and protein concentrates has effect of negative value on fat content and positive value on protein content of camel milk, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camel milk, chemical composition of raw milk, milk quality, lactose, milk fat, milk protein, water content, protein content, total solids, seasonal variations, farm management, Sudan.

Yuan Bao Dong; Zhang Hong Hai; Bao Li Ming; Dou Hua Shano. **Wolf predation on livestock in Dalai Lake Nature Reserve Inner Mongolia**. *Chinese Journal of Zoology*. 2008; 43(3): 81-86. ISSN: 0250-3263. Note: In Chinese.
Abstract: We examined predation on livestock of wolf (*Canis lupus*) by both field survey and resident interview method in Dalai Lake Nature Reserve, Inner-Mongolia, China, from Jul 2004 to Jan 2007. Totally 95 predation were claimed by the residents, in which total of 425 livestock were killed. The residents lost 186 575.00 RMB at least from those predations. We record the date of killing, species and number of killing, age of victim, location of killing. We analyzed 9 variables by GIS technique and tested the significance of difference between those variables by Mann-Whitney U test. PCA method was employed to identify the principal components among the 9 variables. Results showed that sheep, cattle and horses were the main species of livestock that wolf preyed on, 94.16% of the victims were sheep Camel and donkey were casually predated. Most predation occurred during the frozen season (Sep-Feb, 89.74%). Location of predation was influence in the order of importance by human disturbance, habitat type, livestock species, distance to rest site, sheltering class, distance to water source, season, number of killed, distance to stockade. Result of principal components analysis(PCA) showed that the first 3 principal components explained 81.544% of the total variance among all predation habitat variables. According to absolute value of coefficient, the 3 components were classified separately as sheltering class factor, disturbance factor and water factor. Sheltering class factor is the chief factor influencing the location of predation. Shortage of prey is key reason of killing on livestock.
Descriptors: livestock, sheep, camel, donkey, wolf predation data(species, date, age, location) 9 variables by GIS technique, human disturbance factors, shelter, water, season, rest site, distance to protection, date, natural prey species levels declined, Dalai Lake Nature Reserve, Inner Mongolia, China.

2007

Abdoun, KA; Amin, ASA; Abdelatif, AM. **Milk composition of dromedary camels (*Camelus dromedarius*): nutritional effects and correlation to corresponding blood parameters.** *Pakistan Journal of Biological Sciences.* 2007; 10(16): 2724-2727. ISSN: 1028 8880
URL: http://www.ansinet.org/pjbs
Abstract: This study has been conducted in order to study the possible correlations between

the nutritional value of plants selected by camels during the dry and green season and the corresponding blood and milk composition of the dromedary camels. The study has been conducted on 50 indigenous Arabian camels of different age and kept under natural range in Southern Darfur. The dromedary camels selected plants with significantly ($p<0.05$) higher crude protein content during the dry season and kept the serum albumin concentration and milk protein content at the same levels as those observed during the green season. However, the significantly ($p<0.05$) higher lipogenic content (ether extract + crude fibre) of the plant selected during the dry season resulted in significantly ($p<0.05$) higher serum triacylglycerides concentration and significantly ($p<0.05$) higher milk fat content compared to that of the green season. Although, the camels selected plants with significantly ($p<0.05$) higher nitrogen free extract content during the dry season, the plasma glucose level and the milk lactose content were significantly ($p<0.05$) reduced compared to that of the green season. The significantly ($p<0.05$) lower ach content of the plants selected during the dry season resulted in significantly lower serum calcium + phosphorus concentration, but did not reflect on the ash content of the milk. The results indicate that despite camels selectivity and unique adaptation to arid conditions, the milk lactose-and fat content were affected by the nutritional scarcity during the dry season. Therefore, it could be beneficial to provide energy-rich feed supplemented with calcium and phosphorus to camels kept under dry tropical conditions.
Descriptors: dromedary camels, camel milk, crude protein, feed supplements, hematology, lactose, lipids, milk composition, milk fat, butterfat, milk protein, nutritive value, phosphorus, calcium, plant composition, triacylglycerols, tropics, chemical constituents of plants, hematology, lipins, milk constituents, milk sugar, nutritional value, quality, for nutrition, triglycerides, tropical countries, tropical zones.

Abeiderrahmane, N. **The impact of a camel dairy: a way to increase funding for camel scientists?** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 190-194.
Abstract: The presentation briefly outlines the history of Tiviski, a private firm set up in 1987 to bridge the gap between pastoral raw milk and an urban population who had access only to imported sterilised or powder milk. The business plan was based on three design choices, i.e. collecting fresh milk from mobile herders, packaging milk in cartons and selling to corner-shop retailers, all with refrigerators. Initial investment was 1.8 million French Francs. The first product was pasteurised camel milk, followed by cow milk and a growing product range. After almost 18 years, production averages 15 000 litres/day, of which 20 to 40% is camel milk. Current annual income is about US $ 5.5 million, for a cumulated investment of about $ 5.2 million. The impact of the small dairy far exceeds its size or expectations. About 1,000 supplier families now enjoy an improved standard of living from bigger herd size, productivity and value; livestock enjoys better care and feeding. Consumers benefit from good fresh safe milk, the economy gains jobs, added value, and foreign currency savings. Present widespread interest in camel milk opens a broad avenue both for developing modern camel dairies as a good way to ensure camels' and camel-breeders' survival and growth, as well as for raising more interest in and funding for camel research. Camel scientists are now urgently required to direct their research towards topics such as the health benefits of camel milk (things that can be put on a label), camel milk technology, health risks

for protected countries, and regulatory issues, e.g. inspection and quality tests. Reproduced with permission of CAB.
Descriptors: dromedary camel milk, milk hygiene, dairies, dairy industry, herd size, herd productivity, and herd value, milk production, milk quality, pasteurized milk, quality controls, raw milk, Mauritania.

Adugna Tolera; Aster Abebe. **Livestock production in pastoral and agro-pastoral production systems of southern Ethiopia**. *Livestock Research for Rural Development*. 2007; 19(12): 19177. ISSN: 0121-3784
Abstract: Livestock production situation and feed resources availability in pastoral and agro-pastoral production system of southern Ethiopia were assessed based on field visits and interview of selected households as well as group discussions with the pastoralists. A semi-structured questionnaire was used for interviewing 60 randomly selected pastoralists. Informal discussions were also held with a group of pastoralists in each of the areas assessed as well as with the development agents working in the localities. The collected data were analyzed using descriptive statistics. The survey showed that numerically cattle are the most important species followed by goats, camels and sheep. The main feed resources of the area are natural pastures (herbaceous vegetation composed mainly of grasses and forbs and browses such as shrubs, tree leaves and pods), which show marked seasonal variation in availability and quality based on variability of rainfall distribution. Productivity of animals in terms of milk production, growth rate and reproductive performance is generally low. Crop production is increasingly practiced as a means of economic diversification although crop failure is a common feature because of unreliable rainfall and frequent drought. Thus, livestock production remains to be the main means of livelihood. Hence, more emphasis should be given to improving livestock productivity and proper management of the rangelands. Efforts to reverse or at least halt the advancement of bush encroachment should be encouraged and strengthened.
Descriptors: dromedary camels, cattle, sheep, goats, agropastoral systems, animal production, crop production, farming systems, feeds, growth rate, livestock, milk production, pastoralism, reproductive performance, seasonal variation, surveys, agricultural systems, seasonal changes, seasonal fluctuations, Abyssinia, Ethiopia.

Ahmed, SM; Hegde, BP. **Preliminary study on the major important camel calf diseases and other factors causing calf mortality in the Somali Regional state of Ethiopia.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference " Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 31-41.
Abstract: This study was undertaken in 5 randomly selected districts of Aider zone. 15 households were selected from each district. A total of 75 households were included in this study. Random sampling technique was used. Calf mortality was seen as prenatal death due to abortion, postnatal death from first week to 3 months of calf age and before weaning period. The latter was mainly caused by some endemic diseases and other associated factors. In this study, the abortion rate was 16% and was caused by several factors. These included accidental death of fetus and trypanosomiasis, which contributed 64.3 and 28.6%, respectively, in the case of Jarati, whereas trypanosomiasis and stress conditions contributed 40 and

46.7%, respectively, in the case of Hargelle. On the other hand, stress conditions caused by adverse environmental conditions and unidentified poisonous plants contributed 26.7 and 73.3%, respectively, in the case of Barey. Similarly, trypanosomiasis, accidental death and stress conditions and browsing of poisonous plants contributed 33.3, 40.0, 20.0 and 6.7%, respectively, in the case of Dollo-Bay. With regard to El-kari district, about 66.7, 26.7 and 6.7% of respondents claimed that abortion was caused by accidental deaths, poisonous plants and stressful conditions, respectively. On the other hand, calf death was very high during the first week after birth. About 60, 50, 55, 45, 35% of Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggested that an average 51% of calf losses were encountered during the first week of calves. Calf mortality of about 30% was encountered during the first 90 days of calf age, whereas the remaining 19% were encountered after 90 days of calf life before weaning. Poor colostrum feeding practice was also believed to be one of the major causes of calf mortality during the first week of life. Furthermore, some endemic diseases and other associated factors were also reported to be among the major causes of calf mortality during the lactation period before weaning. The most important disease found was calf scour (daab). The morbidity and mortality rates of calf scour were 87 and 39%, respectively. Sunken eye (ilqod) was considered as the second problematic disease of calves by herders. The disease caused serious economic losses to the households through loss of milk after death of the calves. The morbidity and mortality rates due to sunken eyes were 57 and 12%, respectively. Contagious ecthyma (canbaruur) was considered as one of the important diseases of calves by herders. The morbidity and mortality rates of contagious ecthyma were 75 and 6.9%, respectively. Contagious necrotic skin was also considered as one of the important diseases of calves by herders. About 88% of all districts reported that the disease affected their calves with morbidity and mortality rates of 35 and 4.6%, respectively. Other endemic diseases reported were trypanosomiasis with morbidity and mortality rates of 9.6 and 6.7%. Camel pox had morbidity and mortality rates of 42 and 7%, respectively. Pneumonia had a mortality rate of 7%. On the other hand, factors causing calf losses included predation which was about 4.8, 23.8, 26.6, 16.7, and 26.2% in Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggesting that predators were considered next to diseases in causing calf mortality. Reproduced with permission of CAB.

Descriptors: dromedarycamels, calves, fetal abortion, age differences, animal diseases, anthrax, camel milk, colostrum, deformities, diarrhea, losses *scarcoptes* mange, morbidity, pneumonia, mortalitynecrosis, poisoning, poisonous plants, predation, stress, toxicity, trypanosomiasis, viral diseases, *Bacillus anthracis*, Contagious ecthyma virus, plants, *Trypanosoma*, contagious pustular dermatitis, CPD virus, death rate, diarrhea, orf virus, scabby mouth, sore mouth, toxic plants, toxicosis, trypanosomosis, ulcerative dermatosis, viral infections, Abyssinia, Ethiopia.

Ahmed, SM; Hegde, BP. **Traditional camel calf management and milking practices in Somali regional state of Ethiopia.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference." Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 115-122.

Abstracts : The study was undertaken in the 5 randomly selected districts of Afder zone in which 15 households were selected from each districts and total 75 households were selected. The study revealed that immediate postnatal care is needed to check calf mortality. About

38% of respondents ranked 1st order of importance to remove covering membrane to the new born calf after birth. On other hand, about 24% ranked 1st to place the calf in front of the dams. The practice to air ear/nose to protect suffocations, by beat chest of newborn, to stretch limbs with number of times and placing the calf under tree to get shade were important steps taken by respondents. Isolating the newborn calves with their dams from rest of herd during the first week of calves lives was widely practiced. This period was locally called life training period which varied from 7 to 30 days. The camel calves started to browse/graze at the age of 20 to 60 days. Fostering were practices to maintain lactation and to prevent dams from drying. Female calves born were allowed to live without any selection. However, owners practice continuous selection of male calves for breeding purposes. The final Selection was done at the age of 2-3 years. Male calves culling were mainly practised due to unwanted breeding (15.2 to 60%) drought constraints (70.0 to 73.3%) and weakness and diseases (13.4 to 20.0%). The mean weaning age of studied herds was almost two years. Early weaning was reported to cause weakness and ill health to calves (64%) and retarded growth (80%). Camel owners adopted several pre and pest-colostrum steps. Although camel owners believed that first colostrum sessions was dangerous to the health of newborn they delayed calves suckling for this purpose but again they were aware the usefulness of colostrum to help the newborn calves. About 57, 33.3, 53.3, 53.3 and 53.3% of Jarati, Hargelle, Barey, Dollo-Bay and El-kari, respectively suggested that colostrum helps calves to growth and its causes beautifulness of calves. Again 14.3, 20.0, 6.7, 6.7 and 6.7 of Jarati, Hargelle, Barey, Dollo-Bay and El-kari, respectively suggested that colostrum gives ability to resist diseases. On other hand, during dry season calves were reported to face serious milk competition from household members. Reproduced with permission of CAB.
Descriptors: camels, new born animals, suckling calves, camel milk, animal feeding, animal health, colostrum, early weaning, farm management, milk production, milking, newborn animals, Abyssinia, Ethiopia.

Al Azraqi, AA. **Relationship of serum leptin concentration to fat deposition in slaughtered young camels.** *Journal of Animal and Veterinary Advances*. 2007; 6(1): 16-19. ISSN: 1680-5593
Abstract: This study was conducted to determine the time of onset of fat deposition in young camels (n=166) and its relationship to body weight, age and serum leptin concentration. The body weight, backfat thickness and serum leptin concentration were measured in the young camels. The serum concentration of leptin increased linearly with the body fat and age and highly correlated with backfat thickness, suggesting that serum leptin content was a good indicator of body fatness in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels,age differences, backfat, body fat, body weight, fat thickness, leptin.

Al Busadah, KA. **Efficacy of feeding bovine and caprine colostrum to neonatal camel.** *Journal of Animal and Veterinary Advances.* 2007; 6(1): 5-7. ISSN: 1680-5593
Abstract: The failure of passive transfer of colostral IgG and efficacy of administered bovine and caprine colostrum as a source of IgG to camel neonates were investigated. Neonates (n=32) were randomly assigned to one of three treatments. Group I (n=16) was left to suckle their dams. Group II neonates (n=8) were colostrum-deprived but supplemented with 500 ml of pooled bovine colostrum given orally at 2-h intervals from 2 to 20 h after parturition.

Group III neonates (n=8) were treated similarly to group II but with caprine colostrum. Suckling produced a peak concentration of 2700+or-270 mg/dl of IgG in 75% of the neonates. 25% percent of the neonates had a maximum IgG concentration of less than 800 mg/dl and considered to have failure of passive transfer of IgG. Comparable neonatal serum IgG peak levels, apparent efficiency of absorption and t 1/2 were demonstrated between the groups. The results suggested that administration of bovine and caprine colostrums could be considered in camel neonates when no camel colostrum was available. Reproduced with permission of CAB.
Descri[ptors: dromedary camels, cattle, goats, newborn animals, feeding cow colostrum, absorption, colostrum IgG, immunoglobulins, passive immunity, suckling, gamma globulins, immune globulins.

Al Busadah, KA. **Efficacy of feeding bovine and caprine colostrum to neonatal camel.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 76-78.
Abstract: Failure of passive transfer of colostral IgG and efficacy of administered bovine and caprine colostrum as a source of IgG to camel neonates have been investigated. Neonates (N=32) were randomly assigned to 1 of 3 treatments. Group 1 (N=16) were left to suckle their dams. Group 2 neonates (N=8) were colostrum deprived but supplemented with 500 ml of pooled bovine colostrum given orally at 2 hour intervals from 2 to 20 hours after parturition. Group 3 neonates (N=8) were treated similar to group 2 but with caprine colostrum. Suckling produced a peak concentration of 2700+270 mg/dl of IgG in 75% of neonates. 25% of neonates had a maximum concentration of less than 800 mg/dl and considered to be failure of passive transfer of IgG. Comparable neonatal serum IgG peak levels, apparent efficiency of absorption and t 1\2 was demonstrated between natural suckling (Group 1) and bovine (Group 2) and caprine (Group 3) colostrum. It is suggested that administration of bovine and caprine colostrum could be considered in camel neonates when no cameline colostrum is available. Reproduced with permission of CAB.
Descriptors: camels, neonates, cattle, goats, animal feeding; bovine and caprine colostrum, colostral antibody, colostral immunity, IgG, immunity, passive immunity.

Al Busadah, KA. **Some biochemical and haematological indices in different breeds of camels in Saudi Arabia**. *Scientific Journal of King Faisal University Basic and Applied Sciences*. 2007; 8(1): 131-142. ISSN: 1658-0311. Note: In English with an Arabic summary.
Abstract: Normal haematological and biochemical parameters have been determined in 3 breeds of Arabian camel (*Camelus dromedaries*) Both males and females were included in the study. Statistical analysis showed non-significant breed or sex effect. Compared to other farm animals haematological indices in the camel characteristically showed that lymphocytes were the predominant leucocytes. Packed cell volume was lower and mean corpuscular haemoglobin concentrations were in excess. Albumin/globulin ratio exceeded 1 and gamma -globulin was the predominant globulin. Reproduced with permission of CAB.
Descriptors: dromedary camels, hematology, hemoglobin, hematocrit, albumins, breed differences, globulins, leucocytes, lymphocytes, white blood cells, Saudi Arabia.

Al Qarawi, AA; El Mougy, SA. **The existence of extrapineal locations for melatonin synthesis in the one-humped camel (*Camelus dromedarius*).** *Biological Rhythm Research*. 2007; 38(1): 55-63. ISSN: 0929-1016

DOI: http://dx.doi.org/10.1080/09291010600832289

Abstract: We studied the sites of melatonin synthesis which was measured using the radioimmunoassay technique in the eye retina, skin, Harderian gland, liver tissue and jejunal mucosa in the immature and mature (non-rutting and rutting) *Camelus dromedarius*. For the first time, melatonin hormone was found in extrapineal sources in camel. These sites included the retina, skin, Harderian gland, liver and jejunal mucosa. The levels of melatonin in these sites reached 80.7, 33.5, 84.6, 548.9 and 2024.1 pg/mg, respectively, in the immature camel. In the mature non-rutting camel, during the non-mating season, the level of melatonin was estimated at 73.7, 41.1, 86.3, 1942.6 and 44112.0 pg/mg, respectively, giving a generally high level. In the mating rutting camel during the winter season, the melatonin level exhibited a level of 77.2, 39.5, 82.0, 930.9 and 14644.0 pg/mg, respectively, with an indication of a general decrease with the exception of the retinal melatonin when compared to the non-rutting camel. It should be noted that the finding of the melatonin hormone in the skin has never been recorded before, and has never been estimated before in other animals. The results in the present investigation also revealed that the wild plants upon which camels usually feed contain a significant amount of melatonin (838.2 pg/g in *Chloris gayana* and 226.6 pg/g in *Anabasis setifera*). This could be one of the factors causing an increase in the level of melatonin in the blood and consequently influencing testicular regression during the non-rutting season.

Descriptors: dromedary camels, non-rutting camels, rutting camels, melatonin hormone synthesis, extrapineal sources found, radioimmunoassay techniques, eye retina, skin, Harderian gland, liver tissue, jejunal mucosa, breeding season, plant composition, reproduction, seasonal variation; seasonality, tissue distribution, *Anabasis setifera*, *Chloris gayana*, endocrine secretion, immunoradiometric assay, radioimmunosorbent assay, seasonal fluctuations.

Al Sobayil, KA; Khalil, MH; Al Saef, AM; Mohamed, KM; Salal, SA. **Genetic evaluation for growth of calves at early stage in Saudi camels.** *Journal of Camel Practice and Research.* 2007; 14(2): 175-180. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A 383 progeny records for Saudi camels were genetically analysed and evaluated for growth performance of body weights at birth and bimonthly, thereafter up to 12 months of age along with gains in weight at 2-month intervals. Data were analysed using DFREML procedure to estimate heritabilities, maternal common environment and random error. Breeding values for growth traits of calves in this population were predicted using an animal model. Phenotypic variations for most growth traits in Saudi camels were moderate or slightly high; ranging from 7.0 to 35.2%. Heritabilities were moderate or slightly high and ranging from 0.24 to 0.40. Ratios of maternal common environment were mostly moderate and ranging from 0.10 to 0.30. The ranges in breeding values for growth traits of animals were 25.3, 39.6, 61.0, 70.1, 83.7, 104.3, 109.6, 111.0, 102.1, 96.7, 81.0, 115.1, and 96.7 kg for body weight at 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 months of age, respectively. While, the ranges in estimates of breeding values for daily gain in weights were 0.270, 0.348, 0.371, 0.471, 0.491, 0.542, and 0.638 kg at intervals of 0-2, 2-4, 4-6, 6-8, 8-10, 10-12, and

0-12 months of age, respectively. Accuracies of breeding values recorded for growth traits were moderate; ranging from 0.46 to 0.75. For the list of all camels, the additive selection responses per generation (SR< sub>A</ sub>) predicted were moderate or high and nearly similar at different stages of growth; ranging from 5.7 to 12.2% relative to the actual mean of the trait. Reproduced with permission of CAB.
Descriptors: dromedary camels, young animals, animal breeding, artificial selection, birth weight, breeding value, genetic analysis, genetic variation, growth, heritability, liveweight, phenotypes, genetic variability, genotypic variability, genotypic variation, heritable characters, Saudi Arabia.

Al Sultan, SI; Mohammed, AM. **The effects of the number of lactations on the chemical composition of camel milk.** *Journal of Camel Practice and Research*. 2007; 14(1): 61-63. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The effect of the number of lactations on the chemical composition of camel milk was studied in 20 she-camels. They were divided into Groups A, B, C and D, each group consisting of 5 she-camels of similar age. Group A was in first, B in second, C in third and D was in the fourth lactation period. The parameter investigated included the pH, specific gravity (S.G.), total solids (T.S.), water content, protein, fat, lactose and minerals (Ca and P). It was shown that the number of lactations had no effect on pH, S.G., T.S. water content and protein, fat, lactose and minerals (Ca and P) of camel milk and the differences were not significant among the 4 groups for these parameters. Reprodcued with permission of CAB.
Descriptors: dromedary camels, camel milk production, camel milk, number of lactations, lactose, milk, sugar, milk composition; milk fat percentage, milk protein percentage, milk quality, minerals, calcium, pH, phosphorus, specific gravity, total solids, water content.

Al Sultan, SI. **Effect of feeding urea-treated wheat straw on body weight gain and biochemical metabolites of young camels.** *Journal of Food, Agriculture and Environment.* 2007; 5(2): 202-203. ISSN: 1459-0255
URL: http://www.isfae.org/scientificjournal.php
Abstract: Ten young camels divided into two groups fed daily with wheat straw and urea-treated wheat straw were used in the study to determine its effect on liveweight gain and blood chemistry. Spraying of urea solution (0.1 g/ml) in water to wheat straw at a concentration of 40 g/kg resulted in two-fold increase in protein content of straw. Results showed that feeding of urea-treated straw to camels significantly increased liveweight gain when compared with camels fed on straw only. Urea-treated straws had no significant effect on the enzyme activities and blood chemistry of treated animals, except on the serum ammonia and urea level. Lack of adverse effect of feeding urea on liver, heart and muscle-specific enzymes suggested that feeding urea at this concentration could be tolerated. Reproduced with permission of CAB.
Descriptors: dromedary camels, young camels, diets, feed treatment, wheat straw, urea additive, protein content increased, effects on live weight gain, blood chemistry, ammonia, enzyme activity.

Al Swailem, AM; Al Busadah, KA; Shehata, MM; Al Anazi, IO; Ejaz Askari. **Classification of Saudi Arabian camel (*Camelus dromedarius*) subtypes based on RAPD technique.** *Journal of Food, Agriculture and Environment.* 2007; 5(1): 143-148. ISSN: 1459-0255

URL: http://www.isfae.org/scientificjournal.php

Abstract: The genetic diversity and relationships amongst the dromedary (*Camelus dromedarius*) populations are poorly documented. This study compares, for the first time, variation in DNA fingerprinting of Saudi Arabian camels. The objective of this study was to analyze the inter- and intra-specific variation and genetic relationship between six widely distributed subtypes belonging to three types (Magateer, Magaheem and Beedh) of Saudi camels. One hundred twenty samples were analyzed by random amplified polymorphic DNA (RAPD) methodology using twenty universal decamer primers. All primers produced novel and polymorphic DNA fragments in all tested samples. The analysis of the electrophoretic patterns revealed a high polymorphism in size, number and intensity of bands. The generated fingerprint patterns were specific, i.e., one type could be differentiated from another. There are differences between the dendrograms generated from each subtype and the relationship between the other subtypes analyzed. However, the fingerprint profiles of the subtype individuals were virtually identical enabling easy distinction of the subtype. Estimation of genetic relationships between the 120 samples of 6 subtypes of 3 camel types using cluster analysis of the UPGMA method revealed two main clusters. Cluster A consisted of two subtypes (Magaheem A and B) with 0.76-0.85 similarity matrix. Cluster B consisted of three subtypes (Magateer B, Beedh A and B) with 0.76-0.83 similarity range. Cluster B is subdivided into two subgroups; Subgroup A includes Magateer B, Subgroup B includes Beedh A and B. Magateer Subtype A is 73% genetically similar to the rest of the subtypes. The average similarity among the twenty samples is more than 80%. Our results suggest a closer relationship between Beedh A and B; Magaheem A and B; and Magateer B and Beedh A and B. Magateer A is the least related to the other subtypes. The intra-specific analysis of the RAPD patterns showed a rich polymorphism in the heterogeneous subtypes of Magateer B, which is in concordance with the variability observed with other phenotypic markers. On the contrary, the other subtypes of Magateer A, Magaheem A and B, and Beedh A and B exhibit a homogeneous pattern indicative of a very low level of DNA polymorphism, which is congruent with the reduced variability found in these subtypes with other molecular markers. It is concluded that, the grouping indicated by the trees are reasonably well correlated with and supported the conventional morphological and physiological classification criteria. Identification of intra- specific variation suggests that RAPD could be having a potential to aid in identification and classification of Saudi camels. The reproducibility of the polymorphisms generated by RAPD in camel may lead to the development of subtype-specific DNA markers of native camel types in Saudi Arabia.

Descriptors: dromedary camels, breed differences classification, DNA fingerprinting, genetic diversity, genetic markers, genetic polymorphism, phenotypes, random amplified polymorphic DNA, Saudi Arabia.

Anomyous. **World dairy situation 2007.** *European Dairy Magazine.* 2007; (7): 10,12. ISSN: 0936-6318

Abstract: This article presents the findings of the International Dairy Federation of the status of world milk production, processing and marketing of milk products in 2007.

Descriptors: buffaloes, camels, cattle, goats, sheep, dairy situation, livestock dairy animals, milk products and volumes, dry skim milk, yogurt, joghurt, cheeses, milk marketing, world markets, milk processing, milk production.

Balmus, Gabriel; Trifonov, Vladimir A; Biltueva, Larisa S; O' Brien, Patricia CM; Alkalaeva, Elena S; Fu, Beiyuan; Skidmore, Julian A; Allen, Twink; Graphodatsky, Alexander S; Yang, Fengtang; Ferguson-Smith, Malcolm A. **Cross-species chromosome painting among camel, cattle, pig and human: further insights into the putative Cetartiodactyla ancestral karyotype.** *Chromosome Research.* 2007 June; 15(4): 499-514. ISSN: 0967-3849
DOI: http://dx.doi.org/10.1007/s10577-007-1154-x
NAL call no: QH600 .C47
Abstract: The great karyotypic differences between camel, cattle and pig, three important domestic animals, have been a challenge for comparative cytogenetic studies based on conventional cytogenetic approaches. To construct a genome-wide comparative chromosome map among these artiodactyls, we made a set of chromosome painting probes from the dromedary camel (*Camelus dromedarius)* by flow sorting and degenerate oligonucleotide primed-PCR. The painting probes were first used to characterize the karyotypes of the dromedary camel (*C. dromedarius*), the Bactrian camel (*C. bactrianus*), the guanaco (*Lama guanicoe*), the alpaca (*L. pacos*) and dromedary x guanaco hybrid karyotypes (all with 2n = 74). These FISH experiments enabled the establishment of a high-resolution GTG-banded karyotype, together with chromosome nomenclature and idiogram for *C. dromedarius*, and revealed that these camelid species have almost identical karyotypes, with only slight variations in the amount and distribution patterns of heterochromatin. Further cross-species chromosome painting between camel, cattle, pig and human with painting probes from the camel and human led to the establishment of genome-wide comparative maps. Between human and camel, pig and camel, and cattle and camel 47, 53 and 53 autosomal conserved segments were detected, respectively. Integrated analysis with previously published comparative maps of human/pig/cattle enabled us to propose a Cetartiodactyla ancestral karyotype and to discuss the early karyotype evolution of Cetartiodactyla. Furthermore, these maps will facilitate the positional cloning of genes by aiding the cross-species transfer of mapping information.
Descriptors: camels, dromedaries, Bactrian camels, guanacos, alpacas, cytogenetics, evolution, *Lama*, Cetartiodactyla, chromosome painting, karyotype.

Bhardwaj, B; Sharma, GD. **Pulmonary pigmentation in camel in arid zone of Rajasthan.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 25-26.
Abstract: A total of 157 camel lung samples were collected and processed for histopathological examination. The incidence of pulmonary silicosis, pulmonary anthracosis and pulmonary haemosiderosis recorded was 5.73, 7.01 and 4.45%, respectively. Microscopically, silicosis revealed aggregation of dust laden phagocytes in alveolar lumen as well as in alveolar wall, especially in peribronchial and perivascular area. In some cases, silicotic nodules were formed with concentric layers of fibres laid down around the aggregates of dust laden phagocytes without any accompanying cellular reaction. Anthracosis revealed focal accumulation of

carbon particles in alveolar wall and lumen, more particularly in perivascular and peribronchial area. There was no accompanying cellular reaction. Numerous haemosiderinophages were seen in the alveolar lumen as well as in the alveolar wall sections stained with Prussian blue method gave blue colour to haemosiderin. Reproduced with permission of CAB.
Descriptors: camels, arid zones, lung diseases, clinical pictures, etiology, pulmonary silicosis, pulmonary anthracosis, pulmonary hemosiderosis, clinical aspects, pathology, histopathology, respiratory diseases, Rajasthan, India.

El Khawas, KM; Abo Zeid, SM; Abo Elmagd, MK. **A pilot study on copper level among domestic animals in Ismailia Governorate.** *Assiut Veterinary Medical Journal.* 2007; 53(114): 207-214. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: Monitoring levels of mineral concentrations in animal tissues is important for assessing the effect of contamination on animal health and safety of animal products in human nutrition. This study evaluated the levels of copper in cattle, buffaloes, camels, sheep and goats reared in Ismailia Governorate, Egypt. Samples of 303 animals aged 6-36 months were collected from the Governorate slaughterhouse at slaughtering and analysed after acid digestion using atomic absorption spectrophotometry (AAS). The mean concentrations obtained per wet weight (ppm) for liver, kidney, muscle, hair and serum were 31.33, 10.87, 5.55, 7.44 and 0.90 in camels; 27.61, 6.01, 4.10, 7.84 and 0.79 in buffaloes; 25.10, 5.61, 4.52, 6.92 and 0.78 in cows; 37.44, 8.08, 7.235, 10.03 and 0.75 in sheep and 25.23, 3.62, 4.75, 6.33 and 0.64 in goats. The highest concentration of copper was in the liver while the lowest was in hair for all animals. These results indicate that sheep have the highest liver copper concentrations, followed by camels, buffaloes, goats and cows.
Descriptors: buffaloes, dromedary camels, goats, sheep, cattle, copper levels, species comparison, atomic absorption spectrophotometry, blood chemistry, hair, kidneys, liver, muscles, tissue distribution, trace element.

Farah, Z; Mollet, M; Younan, M; Dahir, R. **Camel dairy in Somalia: Limiting factors and development potential.** *Livestock Science.* 2007 June; 110(1-2): 187-191. ISSN: 1871-1413
DOI: http://dx.doi.org/10.1016/j.livsci.2006.12.010
NAL call no: SF1 .L5
Descriptors: camels, females dairy animals, camel milk, dairy herds, dairy herd management, surveys, milk analysis, milk composition, milk quality, dairy hygiene, fermented milk, Somalia.

Gahlot, TK (Editor). ***Proceedings of the International Camel Conference "Recent trends in Camelids research and Future strategies for saving Camels", Rajasthan, India, 16-17 February 2007.*** published by Rajasthan, India: College of Veterinary & Animal Science. 2007; iii + 226 pp.

Genin, D; Khorchani, T; Hammadi, M. **Improving nutritive value of a North African range grass (*Stipa tenacissima*): Effect of dung ash and urea treatment on digestion by goats.** *Animal Feed Science and Technology.* 2007 July 15; 136(1-2): 1-10. ISSN: 0377-8401.
DOI: http://dx.doi.org/10.1016/j.anifeedsci.2006.08.013
NAL call no.: SF95.A55

Descriptors: goats, dromedary camels,forage quality, range grass, *Stipa tenacissima,* nutritive value improvement, feces, urea, alkali treatment, rumen fermentation, ruminant nutrition, animal feeding, digestibility, hay, fiber content, in vitro digestibility, Tunisia.

Ghanshyam-Tiwari; Pandey, KP; Sharma, AK. **Performance of some pneumatic tires used in camel carts on sandy terrain.** *AMA, Agricultural Mechanization in Asia, Africa and Latin America.* 2007; 38(1): 46-50. ISSN: 0084-5841

Abstract: Four animal drawn vehichle (ADV) tyres (5.00-19, 6.00-19, 7.00-19 and 8.00-19) and one trailer tyre (7.50-19), commonly used in camel carts in Rajasthan, India, were evaluated under controlled soil bin conditions in sand at different levels of inflation pressure, normal load and soil compaction. Among the tested tyres, 7.00-19 tyre performed better, however, its use in camel carts may not be recommended beyond the payload of 600 daN on single wheel within the inflation pressure and soil compaction range of 172.5 to 379.5 kPa and 3.4 to 4.5 MPa/m, respectively. The developed second order regression model predicts the rolling resistance fairly well within the tested range of various parameters.

Descriptors: camel, hauling equipment performance, carts, trailers, tires, tire inflation pressure, performance tests, tire rolling resistance, sandy soils, soil compaction, soil types, Rajasthan, India.

Gorak (h?) Mal; Sena, DS. **Milk composition among different breeds of camel.** *Indian Veterinary Journal.* 2007; 84(10): 1064-1065. ISSN: 0019-6479

URL: http://www.indvetjournal.com

NAL call no.: 41.8 IN2

Descriptors: camels, Bikaneri, Jaisalmeri, Kachchhi, lactating females, breed differences, milk composition, comparison study, milk protein, casein, milk fat, pH, ash, total solids, solids not fat.

Gregory, NG; Grandin, T. **Other species.** *Animal Welfare and Meat Production.* 2007; 148-167. ISBN: 9781845932152

Descriptors: welfare issues, goats, water buffaloes, yaks, deer, camels, horses, donkeys, ostriches, emus, pigeons, guineapigs, dogs, bushmeat species, meat consumption, meat animal welfare, aggression, animal behavior; animal housing, blood sampling, castration, culling, feather pecking, hunting, inbreeding, meat, mortality, overgrazing, parasitoses, predation, restraint of animals; slaughter facilities and methods, stress,transport of animals, trauma, underfeeding, water intake, environmental degradation.

Guliye, AY; Noor, IM; Bebe, BO; Kosgey, IS. **Role of camels (*Camelus dromedarius*) in the traditional lifestyle of Somali pastoralists in northern Kenya.** *Outlook on Agriculture.* 2007; 36(1): 29-34. ISSN: 0030-7270

URL: http://www.ippublishing.com

Abstract: This paper describes the role of the camel in shaping and supporting the pastoral economy and culture of the Somali community in northern Kenya. Over 70% of Kenya's land mass consists of arid and semi-arid lands (ASALs) of low agricultural potential, and northern Kenya falls within this region. Extensive livestock grazing, in a nomadic pastoral production system, is the most suitable means of utilizing ASALs. Of the many nomadic

communities living in northern Kenya, the Somali tribe is perhaps the largest keeping mainly camels, but also cattle and small stock (sheep and goats). Camels are well adapted to the harsh conditions of the ASALs. In the Somali pastoral lifestyle, camels play multiple roles, of which milk production is perhaps the most important. Camel meat is a delicacy not to be missed during festivities. Male camels are also used for transportation of water, and of household items when families move to new grazing sites within the range. In addition, camels have an important role in traditional social relations, such as in payment of a dowry, and in compensation of injured parties in clan feuds. In the Somali culture, camel ownership (in terms of herd size) is an indication of social status. Also, in the Somali traditional economy, camels are the main reserve stock, and therefore act as a store of wealth and security against drought, disease and other natural calamities. Reproduced with permission of CAB.
Descriptors: dromedary camels, arid zones, lifestyle, pastoral society, pastoralism, arid regions, socioeconomics, aspects, Kenya.

Khalil, MH; Al Sobayil, KA; Al Saef, AM; Mohamed, KM; Salal, SA. **Genetic aspects for milk traits in Saudi camels.** *Journal of Camel Practice and Research.* 2007; 14(1): 55-59. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A total of 269 lactation records for Saudi Arabian she-camels were genetically analysed and evaluated for lactation traits of milk yield of the first three months of lactation, annual milk yield, total milk yield, length of lactation period, monthly milk yield and daily milk yield. Data were analysed using DFREML procedure to estimate direct additive effects (i.e. direct heritabilities), permanent environment and random errors. Breeding values of camels with and without records in this population were predicted for lactation traits using an animal model. Heritabilities were moderate and ranged from 0.08-0.25. Ratios of permanent environment were also moderate and ranged from 0.16-0.22. The ranges in breeding values for the animals with and without records were moderate or high, e.g. 166.8 kg, 1312 kg, 1436 kg, 282 day, 121.2 kg and 3.044 kg for 3-month milk yield, annual milk yield, total milk yield, lactation period, monthly milk yield and daily milk yield, respectively. Accuracies of breeding values recorded for lactation traits were high and was 0.42-0.76. The percentage of animals that had positive estimates of breeding values for all traits were nearly similar and was 53.3-57.30%. The rates of selection responses predicted were moderate or high, where these rates ranged from 3.1 to 9.6%, relative to the actual mean of the trait. Reproduced with permission of CAB.
Descriptors: dromedary camels, heritable characters, lactation duration, milk production, milk yield, performance traits, breeding value, environmental factors, genetic analysis, genetic factors, heritability, Saudi Arabia.

Kohler Rollefson, I; Hanwant Singh; Benard,C. **Halting the decline of Rajasthan's camel population through community-based approaches and marketing support.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 108-114.
Abstract: Rajasthan's camel population has declined by an estimated 50% over the last decade. In order to reverse this trend, Lokhit Pashu-Palak Sansthan (LPPS), a local NGO

that supports traditional livestock keepers, has initiated a two-year project that seeks to support camel breeders to access additional income from their herds. In order to promote and develop the potential of the camel for creating income in Rajasthan's desert areas, the project conducts the following activities: * Educating and raising awareness of traditional camel breeding communities about new marketing options. * Supporting camel breeders in innovating their production systems; * Establishing linkages with research institutes; * Laisoning and lobbying with government agencies for providing an appropriate policy framework; * Catalysing private sector involvement and investment in the manufacturing and marketing of camel products; * Strengthening camel breeders' organisation to retain ownership of production processes. * Facilitating establishment of a common platform for all stakeholders in the camel. The project that was launched in mid-2006, is looking into value-addition to various camel products, especially camel milk. Ice cream made from camel milk, that was launched during an inception workshop, has generated significant interest among local hoteliers. The ice cream also met an exceptionally good response by the international media that hailed is as a means of "trimming Indian waistlines". This paper will summarise the early experiences of the project, including the results of a comprehensive survey undertaken in the district of Jaisalmer. Furthermore, it will analyse the hurdles that need to be overcome before value-added products can truly contribute to improve local incomes and livelihoods. Reproduced with permission of CAB.
Descriptors: camels, populations decrease, camel milk, animal breeding, animal production, constraints, factors of production, income, livestock numbers, marketing, milk production, non governmental organizations, camel derived products, value added, Rajasthan, India.

Kuria, SG; Wahome, RG; Gachuiri, CK; Wanyoike, MM; Mwangi, JN. **Use of linear body measurements in estimating live weight of camel (*Camelus dromedarius*) calves in Kenya.** *Journal of Camel Practice and Research*. 2007; 14(1): 21-25. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A study was conducted in Kargi and Ngurunit locations of Marsabit district of Kenya to develop a formula for estimating the liveweight of camel calves in pastoral situations using linear body measurements. Thoracic girth (TG), hump girth (HG) and shoulder height (SH) measurements were taken using an ordinary tape measure on 64 suckling calves at Kargi and 77 at Ngurunit aged 3 weeks to 7 months. Analysis of variance revealed that the age and breed influenced ($P<0.05$) the linear measurements of camel calves. However, sex and study site did not ($P>0.05$). Correlation analysis suggested that TG had the greatest influence on liveweight of calves ($P<0.05$, $r=0.96$). Shoulder height had the least influence ($P<0.05$, $r=0.82$). Regression analysis showed that the combined effect of TG, HG and SH on liveweight of calves was higher ($P<0.05$, $R2=0.95$) than that of the individual variables and combinations of any two of them. The formula Body weight (kg)=-200.86+105.91 TG(m)+79.63 HGO(m)+56.22 SH(m) was developed. Given the values of TG, HG and SH, this formula could be used to estimate the liveweight of camel calves with 95% accuracy level. Reproduced with permission of CAB.
Descriptors: dromedary camels, young animals, camel calves, age differences, body measurements, body weight calculations, breed differences.

Lesnoff, M; Lancelot, R; Juanes, X; Messad, S; Sahut, C. **LASER and 12MO: two methods and tools for estimating baseline livestock demographic parameters in developing countries.** In: E Camus; E Cardinale; C Dalibard; D Marinez; JF Renard; F Roger. *Proceedings of the 12 th International Conference of the Association of Institutions for Tropical Veterinary Medicine AITVM, Montpellier, France, 20-22 August, 2007. Does Control of Animal Infectious Risks Offer a New International Perspective?* Published by CIRAD. 2007; 374. ISBN: 9782876146501. Note: A conference paper.
Descriptors: dromedary camels,animal production, data collection, demography, estimation, extensive farming, livestock, methodology, Third World; Underdeveloped Countries, Developing Countries.

Lokesh Gupta; Tiwari, G S; Chaudhary, JL. **Effect of feeding different levels of energy on draught performance and physiological responses in camels.** *Indian Veterinary Journal.* 2008; 85(8): 869-871. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Nine draught camels, 8-10 years old, were equally divided into three groups and fed with ad libitum moth straw (*Phaseolus acontifolius*)+65% TDN (T1), ad libitum moth straw+70% TDN (T2) and ad libitum moth straw+75% TDN (T3) in concentrate mixture. Results revealed that camels fed with ad libitum moth straw+75% TDN level showed improved DM, DCP and TDN intake. The average speed and power developed was significantly higher in T3 when compared with T1 and T2. It was observed that camels tolerated the work stress without any apparent adverse effect on physiological responses when fed with higher energy diets. It is suggested that draught camels should be supplemented with extra energy for added draught power.
Descriptors: dromedary camels, diets, different levels ofenergy content in feed, energy intake, nutrient intake, plane of nutrition, heat stress, stress response.

Longo-Hammouda, FH; Siboukheur, OE; Chehma, A. **Aspects nutritionnels des paturages les plus apprecies par Camelus dromedarius en Algerie. [Nutritional aspect of best grazing consummate by *Camelus dromedarius* in Algeria.]** *Cahiers Agricultures.* 2007; 16(6): 477-483. ISSN: 1166-7699. Note: In French with an English summary.
Abstract: We have inducted an investigation in the areas of Ouargla, Ghardaia and El-Golea with a view to both inventorying plants picked by the dromedary and studying their chemical composition and digestibility. Six plants were thus examined: 3 “acheb” and 3 perennial plants. The ash composition is significantly higher for the “acheb” (12 to 29%) than for the perennial plants (5 to 12%). As concerns total nitrogen matter, the content varies from 6 to 12% and 4 to 9% respectively for the “acheb” and the perennial plants. The perennial plants are richer in parietal compounds evaluated in NDF (74% versus an average of 58%). As concerns in vitro digestibility of dry matter, the best results are obtained with the “acheb” (59 to 44%) as opposed (22 to 45%) for the perennial plants. Reproduced with permission of CAB.
Descriptors: dromedary camels, grazing, in vitro digestibility, nitrogen, nutritive value, pastures, digestibility in vitro, grazing lands, nutritional value, quality for nutrition.

Mehta, SC; Sahani, MS. **Microsatellite markers for genetic characterisation of Bikaneri camel.** *Indian Journal of Animal Sciences.* 2007; 77(6): 509-512. ISSN: 0367-8318

Abstract: Microsatellite loci (16) were investigated for studying the genetic polymorphism in Bikaneri camels. Out of there 13 loci were found polymorphic. The number of alleles ranged from 2 to 7. The expected heterozygosity ranged from 0.289 to 0.815. The polymorphic information content ranged from 0.267 to 0.789. The results indicated existence of enough genetic variation among dromedary individuals and the potential use of microsatellite markers for further genetic diversity analyses and production enhancement.

Descriptors: dromedary camels, Bikaneri breed, sheep, alleles, characterization, genetic diversity, genetic markers, genetic polymorphism, heterozygosity, microsatellites, minisatellites.

Mehta, SC; Goyal, A; Sahani, MS. **Microsatellite markers for genetic characterisation of Kachchhi camel.** *Indian Journal of Biotechnology.* 2007; 6(3): 336-339. ISSN: 0972-5849

URL: http://www.niscair.res.in

Abstract: Sixteen microsatellite loci were investigated for studying the genetic polymorphism in Kachchhi breed of camel. Polymerase chain reactions were carried out for 50 unrelated camels of Kachchhi breed. The amplification products were resolved in 6% (denaturing) urea PAGE and stained with silver nitrate. Out of the 16 microsatellite loci, 13 were found polymorphic. The number of alleles ranged from 2 to 6. The expected heterozygosity ranged from 0.332 to 0.796. The polymorphic information content ranged from 0.277 to 0.765. The results indicated existence of enough genetic variation among dromedary individuals and the potential use of microsatellite markers for further genetic investigations including genetic diversity analysis, individual identification, parentage testing and production enhancement. Reproduced with permission of CAB.

Descriptors: dromedary camel breeds, Kachchhi breed, genetic analysis, genetic diversity, genetic markers, genetic polymorphism, genetic variation, heterozygosity, microsatellites, PCR, polymerase chain reaction, population genetics, genotypic variation, minisatellites, India.

Mohammed, AK; Sackey, AKB; Tekdek, LB; Gefu, JO. **Comparative assessment of draught performance of the one humped camel (*Camelus dromedarius*) and Bunaji work bulls in Zaria, Nigeria.** *Journal of Camel Practice and Research*. 2007; 14(2): 199-202. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: The study was carried out to evaluate the draught performance of the dromedary and Bunaji work bulls as draught animals for ridging, ploughing and weeding operations in a sub-humid environment of Nigeria. 4 work dromedaries singly harnessed and 8 Bunaji work bulls yoked in pairs were used for the evaluation. The camel's mean weight was 450+or-12.8 kg while a pair of bulls weighed 760+or-15.4 kg. The animals were made to plough, ridge and weed an area of 1500 m2 of uncultivated flat land. The absolute draught force produced by one dromedary for ridging (0.80 kN), weeding (0.36 kN) and ploughing (0.18 kN) were not significantly different (P>0.05) from that produced by a pair of work bulls (0.79 kN, 0.30 kN, 0.30 kN) for same operations, although the live weight of a pair of work bulls (760+or-15.4 kg) was significantly (P<0.01) higher than that of a single dromedary (450+or-12.8 kg). The bulls ridged 0.23 ha of land per hour (1 ha/4.4 hours) which was significantly

(P<0.01) faster than the camel's 0.18 ha per hour (1 ha/5.3 hours). It is thus conclusive from this study that, the one humped camel can be efficiently utilised as an alternative draught ruminant in the sub-humid savannah zone of Nigeria. Reproduced with permission of CAB.
Descriptors: dromedary camels, draft camels, Bunaji work bulls, animal power, liveweight, working camels, Nigeria.

Muhammad Shafiq; Kakar, MA. **Effects of drought on livestock sector in Balochistan province of Pakistan.** *International Journal of Agriculture and Biology.* 2007; 9(4): 657-665. ISSN: 1560-8530
URL: http://www.fspublishers.org/
Abstract: Drought is a period of abnormally dry weather sufficiently prolonged due to the lack of precipitation, causing a serious hydrological imbalance and carries connotations of a moisture deficiency for man. The chief characteristic of a drought is a decrease of water availability in a particular period and over a particular area. The drought prevalent in the country these days is not due to a single factor. Drought has negatively affected river flows, resulting in dry-up or minimal flow of water in the canals. Although drought has affected whole of Pakistan, the Balochistan province is the worst hit. It caused huge loss to life, particularly to livestock, including sheep, goats, cattle, camels, horses, donkeys and poultry and in some area buffaloes, which is likely to further affect agricultural economy of Balochistan. Recently, severe drought has jolted many parts of the region. This review is an attempt to look into the drought's catastrophes and its effect on the economy of Balochistan, specifically focusing on livestock. Reproduced with permission of CAB.
Descriptors: buffaloes, dromedary camels, asses, cattle, donkeys, goats, horses, sheep, domestic birds, poultry, livestock animal production, domestic animals, drought, economic impact, farming reviews, water supply, Balochistan, Pakistan.

Muhammad Yaqoob; Haq Nawaz. **Potential of Pakistani camel for dairy and other uses.** *Animal Science Journal.* 2007; 78(5): 467-475. ISSN: 1344-3941
DOI: http://dx.doi.org/10.1111/j.1740-0929.2007.00464.x
NAL call no: SF1 .A542
Abstract: Camels have the potential for milk, meat and draught power and can contribute a handsome share of the production of these commodities. The potential of this wonderful animal has never been realized and it could be harnessed as a prospective milk producing animal. The future of animals that can thrive under harsh environmental conditions, the camel being at the top of the list, is bright. The camel is still a neglected species in Pakistan and has not received the proper attention of researchers and scientists. The population explosion, urbanization and industrialization have expanded agricultural activities to produce more food for the rapid growing human population of the country. Cultivated areas are shrinking, thus reducing the fodder production area for buffalo and cattle. Under these circumstances we have to search for other available sources to enhance milk production. The environmental changes occurring on the earth and the water shortage in the region have also adversely affected the production potential of buffalo, cattle, goats and sheep. Under these changing ecological circumstances, rearing camel is the best option for more milk production and the proper utilization of the vast unused lands of this country. Most studies also have named the camel as an animal of great socioeconomic importance in large tracts of the industrializing

world. The camel serves as a cheaper source of power for drawing water from wells, ploughing and leveling land, working mini extraction mills (extracting from oil seeds), grinding wheat, corn and other grains and crushing sugarcane and pulling carts for the transportation of goods as well as people. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel power, camel production, camel milk, draft animals, dual purpose breeds, milk production, milk yield, milk yielding animals, production economics, socioeconomics, working animals, draft-animals; economics-of-production, socioeconomic aspects, traction animals, Pakistan.

Nagpal, AK; Roy, AK; Jakhmola, RC. **Production potential of pala (*Zizyphus nummularia*) leaves for rutting camels.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 151-152.
Abstract: Pala (*Zizyphus nummularia*) leaves were fed adlibitum to 3 adult camel studs (age 9-14 years, body weight 652.00+or-18.56 kg) for 121 days during rutting season from January to May. The nutritive value of pala leaves was 8.89% DCP and 59.24% TDN and 8.92 MJ ME/kg DM. The daily intakes of DM, DCP, TDN and ME were 67.05 g, 6.05 g, 39.58 g and 0.599 MJ/kg W0.75, respectively. There was no loss in body weight of rutting camels during the experimental period. It was concluded that Pala leaves as sole roughage ration can meet the maintenance requirements of camel studs. Reproduced with permission of CAB.
Descriptors: camels, adult male studs,animal feeding, *Ziziphus nummularia,* browse, browse plants, leaves, food requirements, chemical composition, crude protein, dry matter, energy cost of maintenance, feed intake, metabolizable energy, nutrient requirements, nutritive value, plant composition, total digestible nutrients, dietary standards.

Patel, MK; Parnerkar, S; Wadhwani, KN; Patel, KS; Solanki, JV; Patel, AM. **Breed characteristics of Kachchhi camel.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 51-54.
Abstract: 34 villages comprising of 74 camel herds of three major thickly populated talukas of Kachchhi districts viz. Lakhpat, Bhuj and Raper surveyed for 3 consecutive seasons from March to December on 326 Kachchhi camels of different age groups to study breed characteristics of Kachchhi camel. The Kachchhi camels were light to medium in size with dark brown or reddish brown coat colour. These camels have small erect ears with tips turning in. The camel have small and wide set muzzles and lips. Adult she camels has capacious bowl type udder and medium sized cylindrical teats. The average length of body, height at withers and heart girth was observed to be 61.17+or-1.32, 11.42+or-1.35 and 76.92+or-2.81 cm in male and 61.46+or-1.01, 109.15+or-1.13 and 72.77+or-1.58 cm in female, respectively at birth. The corresponding measurements in adult were 159.82+or-2.10, 195.00+or-3.55 and 195.93+or-2.11 cm in male and 156.15+or-0.78, 192.18+or-0.77 and 204.75+or-10.77 cm in female, respectively. The height at wither in adult camel was found to be a reliable measure for growth from its association with important body measurements. The head length at adulthood was significantly ($P<0.05$) higher in female than male camel but the adult males have massive head as compared to adult females. The adult male camels have significantly

higher value of height at shoulder, knee, stifle and hock than female camels. The males were having significantly (P<0.05) thicker necks at one year and adult age than those of the females. Reproduced with permission of CAB.
Descriptors: Kachchhi one humped camels, varying age groups, unique breed, characteristics, body measurements, body weight, morphology, morphometrics, sex differences, Gujarat, India.

Raziq, A; Younas, M. **Socio-economic profile of camel in Suleiman mountainous region of Balochistan, Pakistan.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 123-128.
Abstract: Suleiman region is situated in the northeastern mountainous belt of Balochistan province of Pakistan. Livestock farming has been a centuries old occupation of a vast majority of the population in Suleiman region. It was the only source of food winning for most of the households, hence, all the family members take their livestock to graze. The livestock farmers follow a regular pattern of seasonal migration. Livestock raising communities live throughout the region, especially in the mountainous areas. Women help feeding animals at home if fodder is available and do the milking and taking care of young and sick animals. By grazing the animals, women and children share the economic burden of the household but it deprives the children of getting an education. This survey was aimed to highlight the characteristics of the camel breeds available in this area and to know better about their role in the life of herders of Suleiman region. Reproduced with permission of CAB.
Descriptors: camel breeds,camel feeding, camel health, camel husbandry, camel production, farm management, farmers families, children's roles, mountain areas, socioeconomics, surveys, Balochistan, Pakistan.

Rocque, S de la; Tran, AL; Etter, E; Vial, L; Hendrickx, G. **Environmental changes, disease ecology and geographic information system-based tools for risk assessment.** *Veterinaria Italiana.* 2007; 43(3): 381-391. ISSN: 0505-401X. Note: In English with an Italian summary.
URL: http://www.izs.it
Abstract: In recent years, several vector-borne, parasitic or zoonotic diseases have emerged or re-emerged in different parts of the world, with major public health, socio-economic and political consequences. Emergence of these diseases is linked to climatic change, human-induced landscape changes and human activities that have affected disease ecology. The authors illustrate geographic information system-based approaches to understand epidemiological processes and predict disease patterns. Continent-wide approaches are used to explore vector and host distributions and identify areas where substantial changes in vector and vector-borne disease distributions have occurred. Time series of high-resolution satellite data and locally collected data reveal the spatial relationships between factors impacting disease dynamics. Using Rift Valley fever as a case study, a conceptual approach is proposed to integrate all of these data and to identify key parameters for disease modelling. Some of the challenges posed by different spatial and temporal scales of the biological processes and associated indicators are highlighted.
Descriptors: dromedary camels, ruminants, humans, disease prevalence, disease vectors, epidemiology, geographical information systems, mathematical models, mosquito borne dis-

eases, Rift Valley fever virus, risk assessment, zoonoses, geographic information systems, GIS, Sahelian zone, zoonotic infections, Africa South of Sahara, Sahel.

Saini, N; Singh, GP; Nagpal, AK. **Nutrient utilization from clusterbean straw, supplemented with urea and *Prosopis cineraria* leaves in growing camel.** *Indian Journal of Dairy Science.* 2007; 60(5): 342-344. ISSN: 0019-5146

URL: http://www.indairyasso.org/current_ijds/jan_2006/dairyman_science.html

Abstract: This study was conducted to determine the effect of urea supplementation (2%) on nine growing male camels. The animals were grouped into three: groups I, II and III were fed with sole clusterbean (*Cyamopsis tetragonoloba)* straw; urea supplemented clusterbean straw; and urea supplemented clusterbean straw with *Prosopis cineraria* leaves, respectively. Results revealed that the total dry matter intake and crude fibre digestibility were significantly higher in group III than the other groups. It was observed that the dry matter, organic matter and crude protein digestibilities; blood urea and total protein were similar and significantly higher in groups II and III. The calculated feed costs for groups I, II and III were 12, 13.56 and 16.77 Rs/day/animal, respectively. Group 1 had a significantly lower feed cost, while groups II and III had significantly lower costs of available nutrients.

Descriptors: dromedary camels, cluster beans, *Cyamopsis tetragonoloba*, digestibility, feed intake, feed supplements, *Prosopis cineraria* leaves, guar, nutrition physiology, production costs, protein digestibility, protein digestion, urea.

Saini, N; Singh, GP. **Effect of groundnut chara feeding in combination with guar phalgati on intake, digestibility and nitrogen recycling pattern in camel.** *Indian Journal of Animal Sciences.* 2007; 77(7): 609-611. ISSN: 0367-8318

Abstract: Comparative performance of growing camel calves (9; age approximately 4-5 years, BW 418+or-19.02 kg) fed guar chara (group 1) alone and in combination with 50% groundnut chara (group 2) and groundnut chara (group 3) as a sole feed was evaluated in terms of digestibility of nutrients, feed efficiency and economics of feeding. No significant difference was observed between groups 2 and I in respect to DMI. Whereas, DMI% of body weight as well as per kg metabolic body weight was significantly higher in group 3 fed groundnut chara than that in groups 2 and 1. Similarly, digestibility coefficient of proximate nutrients except CF was significantly higher in group 3 compared to other groups, while no significant improvement in digestibility of DM, OM, CP, NFE and ADF were observed in groups 2 and 1. The ADG and change in body weight were nonsignificantly different among the treatments. Calculated dietary nitrogen recycled to rumen was 56.52, 45.64 and 36.22%, respectively, in groups 1, 2 and 3. The cost of feed was 12.4+or-0.80, 16.23+or-1.92 and 21.03+or-2.17 Rs/d/animal in respective groups. Although the cost of feed was lower in group 1 but feed/kg gain were significantly higher (41.42+or-2.47) in comparison to groups 2 (26.63+or-3.85) and 3 (20.65+or-1.67). The results of study indicated high feed utilization efficiency of groundnut chara in comparison to guar chara; and further supplementation of 50% groundnut chara to guar chara improved intake and efficiency of nutrients utilization and are also effective and economic means to optimize the utilization of guar chara for better animal performance. Reproduced with permission of CAB.

Descriptors: dromedary camels, costs, digestibility, feed conversion efficiency, feed intake,

groundnuts, guar, liveweight, nitrogen metabolism, performance, peanuts, *Arachis hypogaea*, *Cyamopsis tetragonoloba,* dromedaries costings, guar phalgati.

Saini, N; Kiradoo, BD; Bhardwaj, A; Singh, N; Sahani, MS. **Micronutrient content of certain conventional and unconventional camel feeds of arid western zone of Rajasthan.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 141-143.

Abstract: A survey study was conducted in Bikaner district to assess the mineral content in feeds and fodders of camel at farmer door by collecting samples randomly from 8 villages of 5 Tehsils of Bikaner to identify excess/deficiency of minerals. Mostly, camels are fed by product of crop grown by farmer at their own fields such as cluster bean straw (*Cyamopsis tetragonoloba*), groundnut straw (*Arachis hypogea*), moth (*Phaseolus acontifolius*) and gram straws (*Cicer arietinum*). The ash content in these feeds range 4.25-19.56%. The average calcium content (1.03+or-0.07) was higher in straws in comparison to phosphorus (0.67+or-0.01). The cobalt content of feedstuff was marginal, to meet the requirement of animals (0.50 ppm) whereas, Zn and Mn content were consistently low in all feed stuffs and need to be supplemented in the total ration. The Cu content was on borderline in straws and tree leaves (Avg. 9.64+or-0.23 and 9.6-12.5). Iron content was higher in all the tested feeds, ranging from 165.82 to 194.14 ppm in different feed samples. Ca:P ratio is low as against required ratio of 2:1. Looking into the macro and micro minerals content feeds and fodders grazed/browsed by camels, there is need to supplement Zn, Mn and Cu through specific mineral salt or with green fodders which are comparatively better and cheaper source could be a practical approach to overcome the deficiencies. Reproduced with permission of CAB.

Descriptors: camels, arid zones, fodder, feeds, nutritive value, bean straw, *Cyamopsis tetragonoloba*, groundnut straw, *Arachis hypogea*, moth, *Phaseolus acontifolius*, gram straws, *Cicer arietinum*, chickpeas, *Vigna aconitifolia,* guar, cluster beans, chemical composition, ash, calcium, cobalt, copper, iron, manganese, phosphorus, zinc, mineral supplements, minerals, nutritive value, trace elements, Rajasthan, India.

Shah, MG; Qureshi, AS; Reissmann, M; Schwartz, HJ. **Single nucleotide polymorphism in the coding region of MYF5 gene of the camel (*Camelus dromedarius*).** *Pakistan Veterinary Journal.* 2007; 27(4): 163-166. ISSN: 0253-8318

Abstract: The myogenic factors (MYF) 5 and 6 are integral to the initiation and development of skeletal muscles and to the maintenance of their phenotypes. Thus, they are candidate genes for growth and meat quality-related traits. The MYF5 gene is expressed during proliferation of myoblasts and comprises 3 exons: 500, 76 and 191 bp long. Genomic DNA was isolated from the camel hair using NucleoSpin Tissue kit. Two animals of each of the six breeds namely, Marecha, Dhatti, Larri, Kohi, Sakrai and Cambelpuri were used for sequencing. For PCR amplification of the gene, a primer pair was designed from homolog regions of already published sequences of farm animals from GenBank. Results showed that exon 1 comprising of 422 bp of the dromedary MYF5 gene was more homologous (94%) to the cattle than the dog and human. However, phylogram showed that a small number of mutations had been experienced by dromedary camels at their MYF5 gene and was more near to human than other farm animals. Reproduced with permission of CAB.

Descriptors: dromedary camels, 6 breeds, camel meat, myogenic factors, DNA, exons, genes, meat quality, mutations, single nucleotide polymorphism, skeletal muscle.

Southgate, R; Paltridge, R; Masters, P; Ostendorf, B. **Modelling introduced predator and herbivore distribution in the Tanami Desert, Australia.** *Journal of Arid Environments.* 2007 Feb; 68(3): 438-464. ISSN: 0140-1963
URL: http://www.science-direct.com/science/journal/01401963
DOI: http://dx.doi.org/10.1016/j.jaridenv.2006.06.006
NAL call no: QH541.5.D4J6
Descriptors: deserts, predators, introduced species, feral animals, herbivores, foxes, cats, dingoes, camels, population distribution, geographical distribution, climatic factors, habitat suitability, Northern Territory, Australia.

Tang Bo; Cao GuiFang; Xilin GaoWa; Ren XiuJuan. **Sequence analysis of beta -defensin-1 gene and detection of expression level of the gene in genital tissues of camels.** *Veterinary Science in China.* 2007; 37(6): 515-518. ISSN: 1673-4696. Note: In Chinese with an English summary.
URL: http://www.zgsykx.com/
Abstract: Total RNAs were extracted from the fallopian tube, uterus, cervix and vagina epithelial tissue of camel. Based on the known beta -defensin-1 (caBD-1) cDNA sequence, a pair of primers was designed, and the camel beta -defensin-1 gene was amplified by RT-PCR. The purified RT-PCR product was cloned into pBlueselect T vector and sequenced. Using the same PCR conditions, a beta -actin gene was amplified as the reference gene. Electrophoretic analysis showed that the beta -defensin 1 gene was expressed in different genital tract tissues of camels, and the level of expression of the gene varied among the different tissues. It was concluded that beta -defensin 1 gene played an important role in the innate immune system of the genital tract of camels.
Descriptors: dromedary camels, female genitalia, vagina epithelial tissue, cervix, fallopian tubes, salpinges, oviducts, complementary DNA, DNA cloning, DNA sequencing, gene expression, genes, immune system, nucleotide sequences, RNA, beta defensin 1, cDNA, fallopian tube, nucleotide sequence analysis, nucleotide sequencing.

Tinson, A; Kuhad, KS; Rajesh Sambyal; Rehman, A; Al Masri, J. **Evolution of camel racing in the United Arab Emirates, 1987-2007.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 144-150.
Abstract: There have been considerable changes seen in the camel racing industry over the past 20 years in the United Arab Emirates. An increase in the popularity and the value associated with the racing animals created the need for a well managed and well regulated sport that also served to focus attention on the camels role in the history and heritage of the UAE. In a short space of time camel racing changed from random races in the desert to large circular 8-10 km track races monitored on closed circuit TV. Training evolved from a ride across the dunes to "tafeem" and tread milling. Veterinary treatment became high tech laboratories and hospitals instead of traditional bedu homeopathy and race management developed to post race doping tests and robotic jockeys. This paper will review the changes in the man-

agement of camel racing over the last 20 years and discuss the influence of some of the veterinary and training advances that occurred in the camels in that time. Reproduced with permission of CAB.
Descriptors: dromedary camels, racing camels, animal health, management, training racing camels, racing performance, reviews, veterinary medicine, Trucial States, United Arab Emirates.

Towhidi, A. **Nutritive value of some herbages for dromedary camel in Iran.** *Pakistan Journal of Biological Sciences.* 2007; 10(1): 167-170. ISSN: 1028-8880
URL: http://www.ansinet.org/pjbs
Abstract: To prepare standard tables of chemical composition of feedstuffs and to determine digestibility and palatability of different plant species in dromedary camel, this research was carried out by considering the most consumed herbages of Iranian desert ranges. The plant species studied were: *Atriplex lentiformis*, *Alhagi persarum*, *Seidlitzia rosmarinus*, *Suaeda fruticosa,Haloxylon ammodendron*, *Tamarix kotschyi*, *Hammada salicornica* [*Haloxylon salicornicum*], *Salsola yazdiana*, *Salsola tomentosa,Tamarix aphylla* and *Artemisia sieberi*. Thirty samples of the browsing parts were collected from the rangelands of Yazd province in autumn. Chemical composition of samples including dry matter (DM), crude protein (CP), crude fibre (CF), neutral detergent fibre (NDF), acid detergent fibre (ADF), ether extract (EE), total ash (TA), macroelements (Ca, P, Mg, K), microelements (Fe, Mg, Cu, Zn) and gross energy (GE) were analysed. The in vitro digestibility was determined by camel rumen liquor using Tilley and Terry method. Palatability of the plants were measured by three mature camels in cafeteria trials. The camels voluntarily fed 11 plant species for one hour in six days. Data were analysed by GLM method in SAS software. The highest CP (18.3%) and the lowest NDF (40.4%) and ADF (35.4%) were related to *T. aphylla*. The lowest CP (5.5%) and the highest NDF (72.8%) and ADF (59.6%) were related to *Artemisia sieberi*. The highest organic matter digestibility in dry matter was related to *Haloxylon ammodendron*. The results also indicated that *Atriplex lentiformis*, *Alhagi persarum*, *Seidlitzia rosmarinus*, *Suaeda fruticosa*, *Haloxylon ammodendron*, *Salsola tomentosa*, *Hammada salicornica*, *T. kotschyi*, *Salsola yazdiana*, *T. aphylla* and *Artemisia sieberi* were classified as pleasure feeds. No correlation was observed between %DOMD and chemical composition. Moreover, there was no consistent relationship between the palatability of herbages with %DOMD or chemical composition. Reproduced with permission of CAB.
Descriptors: dromedary camel feeds, feed composition tables, range plants, pasture plants, nutritional value, ash, *calcium*, acid detergent fiber, crude fiber, crude protein, dry matter, energy content, ether extracts, herbage, in vitro digestibility, magnesium, nutritive value, palatability, phosphorus, potassium, rangelands, trace elements, *Atriplex lentiformis*, *Alhagi persarum*, *Seidlitzia rosmarinus*, *Suaeda fruticosa,Haloxylon ammodendron*, *Tamarix kotschyi*, *Hammada salicornica* [*Haloxylon salicornicum*], *Salsola yazdiana*, *Salsola tomentosa,Salsola yazdiana, Seidlitzia rosmarinus, Suaeda fruticosa*, *Suaeda vera*, *Tamarix aphylla*, *Tamarix kotschyi,Artemisia sieberi*, *Artemisia sieberi*, Iran.

Tribhuwan Sharma; Dhuria, RK. **Status of camel nutrition in arid India.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 134-140.

Abstracts: In arid India, the camel production is particularly besieged with the nature of the climate. The tolerance to the rugged climate of high temperature, water deprivation, sustenance on poor and fibrous feeds and endurance from hunger have made the camel of extreme use in arid and semiarid areas. The research on camel nutrition taken up in India is limited. Studies related to feed and fodder resources, nutritional requirements, computation of balanced ration, feed replacement and substitution, mineral nutrition, rate of passage and degradability, formulation of complete feeds and its compaction have been conducted by various researchers. The work has been initiated in a systematic and coordinated manner way back in 1973 at the College of Veterinary and Animal Science, Bikaner, and even earlier at Western Regional Animal Nutrition Research Station, Anand (Gujarat), subsequently followed by various other laboratories and centres. The natural flora (tree leaves, shrubs, bushes etc.) and products of the arid agricultural crops, particularly leguminous straws such as moth (*Phaseolus aconitifolius*), guar (*Cyamopsis tetragonaloba*), gram (*Cicer arietinum)* and groundnut (*Arachis hypogaea)* form the principle feed and fodder resources of camels. Studies that have been taken up regarding nutrient requirements have illustrated the wide variation by a relatively uniform population of camels observing similar exercise. The recommendation with regard to DCP suitable for young camels with respect to age and approximate body weight has been suggested for practical feeding of camels. Since the last decade, work on nutrient utilization in pack camels has also been taken up, giving priority on Bikaneri camels. Studies have shown an increase in intake, digestibility and retention of nutrients due to higher demand for work. Studies of academic interest have shown a faster rate of passage in camels than in bovines, which increases further on feeding of concentrate. Studies on substitution of urea and protein protection have shown that supplementation of protected protein are quite effective and efficiently adoptable in the feeding strategy of camels. Studies on mineral nutrition have indicated that intake of macro and microelements decreases with increasing dehydration, but their absorption increases. Need of supplementation of sodium, magnesium, zinc and manganese in various categories of camels with respect to feed resources has been suggested. In order to keep pace with the alarming nutritional crisis, to make the ration economic and to have sustainable camel rearing, attempts have been made to formulate least cost balanced rations for camels using non-conventional feed resources. Studies have revealed that inclusion of non-conventional feeds in ration of camels is a viable proposition. Over and above this, recent attempts regarding formulation of complete rations and their densification have been taken up successfully to develop a drought proofing technology for camels. Reviewing the overall work that has been taken up on camel nutrition in arid India, it can be concluded that extensive nutritive evaluation of feed and fodder resources of camels in arid region and suggested nutrient requirement for various categories although helpful in computation of ration for attaining nutritional adequacy, the recommended nutrient requirements are still insufficient and information on the requirements of nutrients for maintenance, production, growth, pregnancy and work needs to be ascertained. Work regarding formulation of least cost balanced ration using non-conventional feeds and complete feed formulation and its densification are of practical utility for sustainable camel rearing, and efforts in these aforesaid directions need to continue. Reproduced with permission of CAB.
Descriptors: camels, various age, animal feeding, animal nutrition, arid desert climate, semiarid climate, diets, body weight, feeding for various uses, chemical composition; straw feeds, feed formulations, moth, *Phaseolus aconitifolius*, guar, *Cyamopsis tetragonaloba*, gram, *Cicer*

arietinum, and groundnut, *Arachis hypogaea*, chickpeas, *Vigna aconitifolia,* cluster beans, costs, digestibility, drought, feed intake, feeds, mmineral absorption, magnesium, manganese, sodium, zinc, nutrient requirements, nutrient retention, nutrition physiology, dietary standards, nutritional state, nutritive value, India.

Vijh, RK; Tantia, MS; Mishra, B; Bharani-Kumar, ST. **Genetic diversity and differentiation of dromedarian camel of India.** *Animal Biotechnology***.** 2007 Jan-Dec; 18(1-4): 81-90. ISSN: 1049-5398

NAL call no : SF140.B54A55

Abstract: Estimation of genetic variability and relationship among different livestock breeds is important for management of genetic resources for their sustainable utilization and conservation. This is more important when the livestock species, like camel, have shown a sharp decline in head count during the last decade. In the present study, the genetic variability and relationship among 4 camel breeds of India were estimated using 23 microsatellite loci. A total of 252 alleles were observed across all the 4 populations with mean number of alleles per locus as 8.04, 7.30, 6.39 and 7.43 for Bikaneri, Jaisalmeri, Kutchi and Mewari breeds, respectively. The mean observed heterozygosities of the 4 breeds were 0.58, 0.57, 0.56 and 0.60 for Bikaneri, Jaisalmeri, Kutchi and Mewari breeds, respectively, and were lower than expected heterozygosity values. The mean estimates of F statistics were 0.227+or-0.044 (F< sub>IT</ sub>), 0.157+or-0.038 (F< sub>IS</ sub>) and 0.082+or-0.019 (F< sub>ST</ sub>). The values were significantly different from zero for all the 3 measures and pointed towards the existence of population structure and moderate differentiation in the 4 camel breeds. The exact test also indicated significant population differentiation (P<0.001). The analysis of molecular variance revealed 12% of the variation attributed to among populations and 88% within populations. 69% of the individuals could be correctly assigned using leave one out procedure. All the individuals of Mewari and 42 out of 44 Jaisalmeri were correctly assigned. The existence of strong population structure in Jaisalmeri and Mewari camel was further substantiated by Nei's standard genetic distance as well as interindividual allele sharing distance. Thus, these 2 breeds owing to selection for specific traits were distinct from other camel breeds.

Descriptors: dromedary camels, breed differences, camel breeds, Bikaneri breed, Jaisalmeri breed, Kutchi breed, Mewari breed, genetic variation, genetic markers, microsatellite repeats, alleles, gene frequency, heterozygosity, population structure, genetic distance, genetic relationships, India.

Vimla Dukwal; Sheetal Modi; Mamta Singh. **A comparative study of nutritional composition of camel and cow's milk.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 198-199.

Abstract: A comparative study of nutritional composition of camel and cow's milk was done based on 10 samples of raw milk. Protein and carbohydrate content of camel milk were significantly higher as compared to cow's milk. Similarly the fat content of camel was found to be lower. The percentage of sodium was lower whereas potassium content was higher in camel milk. It was concluded that camel milk contained appreciable amount of protein, carbohydrate and potassium. Reproduced with permission of CAB.

Descriptors: dairy cows, camels, camel milk, cows milk, comparison, carbohydrates, milk composition, milk proteins, milk quality, nutritive value, potassium, sodium, species differences.

Wathig, HM; Galal, MY; Ali, AM; Abdelmalik, I K; Hamid, SA; Mohamed, KA. **Dromedary camels in Sudan, types and sub types, distribution and movement.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 46-50.
Abstract: It is believed that dromedary camels entered Sudan from Egypt based on a specimen of camel hair rope of an old kingdom found at Fayum in Upper Egypt 2980-2475 B.C. In Sudan, the oldest evidence is a bronze figure of a camel with saddle found at Meroe 25-15 B.C., indicating that the animal moved south by that period. Sudan holds the second largest camel population in the world (about 3 342 000). Camels in Sudan and elsewhere are classified as pack (heavy) and riding (light) types according to their function. Recent studies have been made to classify the camels according to their performance (dairy camels, meat camels, dual purpose camels and racing camels). The following classification for the Sudanese camels is based on conformational and tribal ownership: pack; riding; hybrid. The pack camel is the heavy type which makes up the majority of camels that are maintained by nomads (about 80%). These camels are subgrouped into Arabi types and Rashaidi (Sawahli, Deaily and Souda) types. The riding camel is the light type which breeds mainly in the northeast part of the country and in the River Nile State. The best riding camels in the country are found east of the Nile and mainly in Kassala State and Red Sea State. The 2 main types are Annafi and Bishari camels. The hybrid camels takes its own line on breeding. They are called Asshab (Anafi and Arabi), Kilaiwau [Anafi and Shallagyai (Bishhari)] and Banagir [Anafi and Amirab (Bishari)]. Generally, Darfur and Kordufan camel types move north and south, and the eastern camel types mostly move west and east. The camels avoid the clay soil and tsetse fly on southern part of the country during the rainy season while searching for water and food. Reproduced with permission of CAB.
Descriptors: dromedary camels, various breeds, heavy breeds, light riding breeds, dairy breeds, meat breeds, dual purpose camels, racing camels, geographical distribution, distribution patterns, movement, riding animals; working animals, Sudan.

Wernery U. **Camel milk - new observations.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 200-204.
Abstract: The camel is a multi-purpose animal with a huge productive potential. To western societies and even scientists it is unfortunately an alien animal. Only a few people have realised that the camel is the most suitable domestic animal for use in climatic extremes. In time of global warming, growing deserts and increasing scarcity of food and water, the camel can be part of a solution to these problems. Small-scale enterprises have demonstrated that living condition of the nomadic herdsman and his family can be improved by selling surplus camel milk. The Dubai example has also clearly proven that dromedaries can be milked in high-tech dairy farms. Some compositions of camel milk are different from cow milk and their values also differ from cow milk and also between different researchers. Insulin, vitamin C, niacin and some unsaturated fatty acids are higher in camel milk. The absence of beta-

lactoglobulin and the different compositions of proteins in camel milk may prevent allergic reactions. Therefore, camel milk could be an interesting alternative for infant milk products. Although the amount of lactose in camel milk is as high as in cow milk, lactose intolerance against camel milk does not exist. The reason is unknown. Raw camel milk is highly contaminated with bacteria when camels are milked under nomadic conditions lacking proper hygiene. However, there is no doubt that microbiological parameters of camel milk can meet international standards of cow milk when proper hygienic conditions are in place. No microbiological standards for camel milk exist. Camel milk must be heat-inactivated for human consumption. Our investigations showed that the shelf life of pasteurised camel milk kept at 4 degrees C is more than 10 days. Heat-inactivation of 72 degrees C for 5 minutes on different camel milk parameters, including insulin and vitamin C reduces their amount by only 5% to 8%. Gammaglutamyl transferase (GGT) is a potential indicator for the question of whether camel milk has been properly pasteurised or not. Reproduced with permission of CAB.

Descriptors: camel, camel milk, ascorbic acid, gamma-glutamyltransferase, heat-treatment, inactivation, insulin, lactose, raw milk, milk composition, milk hygiene, milk processing, milk production, milk quality, nicotinic acid, niacin, vitamin C, pasteurization, heat treatment, pasteurized milk, quality controls, unsaturated fatty acids, food safety, quality assurance, Dubai.

Yadav, SBS; Bissa, UK; Mehta, SC; Pannu, U; Murdia, CK; Gahlot, GG; Joshi, R; Swami, PD.

Status and prospects of research on genetics and breeding aspects of camels in Rajasthan. In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 55-60.

Abstract: Although the camels are being reared by Indian farmers, especially in the desert as a means of transport for man and materials, cultivation and other agricultural operations for draught, to produce milk, fibre, riding and sports. Initial efforts for genetic and breeding of camel have started in the state during times when large herds of camels were maintained by the state for their use in battles and wars and for large-scale developmental projects such as digging of canals, construction of roads and railway tracts. Most of the management and breeding operations of such herds have been carried out by traditional breeders. Probably, Bikaner is the first state in Rajasthan to establish a camel breeding farm under the state government recognizing the importance of research on Camelus dromedarius. The state camel breeding farm at Jorbeer, Bikaner, has been transformed into the National Research Centre on Camel in 1984. The College of Veterinary and Animal Science established in 1954 has been associated with the state camel breeding farm for treatment, management and to meet other technical needs. Moreover, it is actively involved in research aspects on genetics and breeding as a coordinated effort among the college, state government and National Research Centre on Camel. Basic research on breeding aspects has been conducted for the evaluation of body weight, growth pattern and identification of factors affecting them at different ages. Growth curves have also been developed. The various physiological and atmospheric variables affecting the maturity, reproduction and draught capacity have also been investigated. The efforts have also been made to access the genetic component of variability for some of the traits of economic importance. The direction in research have also taken a turn with the shift

on importance of this species from draught to alternative parameters of economic concern incorporating different biotechnological and molecular genetic aspects of other species of livestock. Recently, a comprehensive investigation on selectivity, longevity and productivity has been conducted. The molecular markers for genetic characterization of Camelus dromedarius have drawn the interest of researchers, and studies on repetitive DNA analysis, uses of microsatellite markers for genetic polymorphism, breed characterization and documentation have been conducted. These detailed population genetic studies and preliminary molecular genetic investigation have set a direction of change required for future research in genetics and breeding of camel. The Bikaneri, Jaisalmeri and Kachchhi breeds besides other strains of camels need to be maintained and multiplied, and the characteristics for QTLs and marker-assisted selection need to be identified. The medicinal value of camel milk, immune system, blood biochemistry and adaptive physiological parameters have to be studied in more detail. Reproduced with permission of CAB.
Descriptors: dromedary camels,breeding traction animals, animal breeding, draft animals, animal power, blood chemistry, body measurements, body weight, breeding value, breeds, genetic markers, genetics, growth curve, growth rate, longevity, molecular genetics, reproduction, research selection, working animals, biochemical genetics, Rajasthan, India.

Yagil, R; Creveld, C van. **Strategies for saving old world camelids.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 185-189.
Abstract: It is a fact that the numbers of camelids world wide are disappearing from their natural habitats. There are many reasons for this sad state of affairs, all man-made. Strategies for halting the decline and increasing in numbers can be implemented, based on introduction of marketable products from the lands where the milch camels exist. The original camel ice-cream was manufactured by the authors over 10 years ago in order to solve the problem of long-term storage of the milk before transportation to the large urban centres. The products must be of superior quality and come from farms that answer the strict international standards. Methodology exists for obtaining relatively large amounts of milk and soon a milking machine will become available, designed specially for the anatomical and physiological peculiarities of she-camels. Experts in camel farming, working in the various countries, should help in making the camels a modern-day money winner, the profits going to help the herders to increase numbers of camels.
Descriptors: dromedary camel milk, conservation, factors of production, ice cream, livestock numbers, milk marketing, milk production, milk products, milk quality.

Yaqoob, Muhammad; Nawaz, Haq. **Potential of Pakistani camel for dairy and other uses.** *Animal Science Journal.* 2007 Oct; 78(5): 467-475. ISSN:
DOI: http://dx.doi.org/10.1111/j.1740-0929.2007.00464.x
NAL call no: SF1 .A542
Abstract: Camels have the potential for milk, meat and draught power and can contribute a handsome share of the production of these commodities. The potential of this wonderful animal has never been realized and it could be harnessed as a prospective milk producing animal. The future of animals that can thrive under harsh environmental conditions, the camel being at the top of the list, is bright. The camel is still a neglected species in Pakistan

and has not received the proper attention of researchers and scientists. The population explosion, urbanization and industrialization have expanded agricultural activities to produce more food for the rapid growing human population of the country. Cultivated areas are shrinking, thus reducing the fodder production area for buffalo and cattle. Under these circumstances we have to search for other available sources to enhance milk production. The environmental changes occurring on the earth and the water shortage in the region have also adversely affected the production potential of buffalo, cattle, goats and sheep. Under these changing ecological circumstances, rearing camel is the best option for more milk production and the proper utilization of the vast unused lands of this country. Most studies also have named the camel as an animal of great socioeconomic importance in large tracts of the industrializing world. The camel serves as a cheaper source of power for drawing water from wells, plowing and leveling land, working mini extraction mills (extracting from oil seeds), grinding wheat, corn and other grains and crushing sugarcane and pulling carts for the transportation of goods as well as people.

Descriptors : Dromedary camels, socioeconomic importance, potential uses, many on farm and small extraction mills, transportation of goods and people, milk, meat, draft power, meglected species, may be more useful than cattle, sheep and goats, Pakistan.

Yohannes Mehari; Zeleke Mekuriaw; Getachew Gebru. **Potentials of camel production in Babilie and Kebribeyah woredas of the Jijiga Zone, Somali Region, Ethiopia.** *Livestock Research for Rural Development.* 2007; 19(4): 19058. ISSN: 0121-3784

Abstract: The study was conducted from July 2005 to January 2006 in Babilie and Kebribeyah woredas, Jijiga Zone of the Somali Regional State with the objective of identifying the production potential of camel in the study areas. The method of data collection employed was a single visit formal survey. The biological and social variables considered were milk production, body weight, and draught power of camel. The data was analyzed using Statistical Package for Social Sciences (SPSS) version 12. In the present study, the majority of respondents (67.5 and 65% for Babilie and Kebribeyah, respectively) indicated the lactation length of camels to be 12 months. There was no significance difference ($p>0.05$) across woredas for frequency of milking for mid and late stages of lactation, in wet season. However, significantly difference ($p <0.05$) in milking frequency in early stages of lactation and in dry season was recorded. There was highly significant difference ($p<0.01$) for estimated mean daily milk yield between the two woredas at an early stage of lactation. In general, the mean daily milk yield was higher during the wet season than the dry season for both woredas. The mean linear body measurement for male and female camels was compared. The data revealed that abdominal girth, chest girth in front of breast pad and chest girth behind breast pad were not significant ($p>0.05$) but there was significant difference ($p<0.05$) in height between sexes. The regular and occasional type of work of camels in the study area was packing, transportation, ploughing and traction. The existence of a wealth of indigenous knowledge for treating different Human and animal diseases was identified in this study. Reproduced with permission of CAB.

Descriptors: camels,camel production, body weight, camel milk, draft camels, lactation, milk production, milk yield, production possibilities, working animals, Somali region, Abyssinia, Ethiopia.

Winter, C. **Tourism, nation and power: a Foucauldian perspective of 'Australia's' Ghan Train.** In: A. Church; T. Coles. *Tourism, Power and Space.* 2007; 101-121. ISBN: 0415329523; 9780415329521

Abstract: This chapter argues that tourism is both a part of, and an effect of, a system of power. The first part of the chapter describes Foucault's theory of power-knowledge, and how it may be used to unpack some of the effects of tourism in creating knowledge about the nation of Australia. The tourism industry is argued to operate as a technology that is positively focused on creating and promoting the nation. The sign for the nation is a fusion of indigenous Australians and their culture, the history of the Afghan cameleers and their camels imported to Australia, and the desert environment that together mediate the idea of the Outback. The second part presents a reading of the Ghan Train as an attraction within the tourism system, which travels the Outback. The Ghan is a physical object that combines imagery from its own past and combines it with those of indigenous Australians and Afghan cameleers to help produce an attraction, or sign for the nation, which can be physically experienced. The effect of these practices is to position indigenous Australians and Afghan people in the past and obscure them in the present. Reprodued with permission of CAB.

Descriptors: indigenous Australians, Afghan cameleers, camels, knowledge, minorities, Australian national consciousness, political power, sociology of tourism, tourist attractions.

Zeleke, ZM. **Non-genetic factors affecting milk yield and milk composition of traditionally managed camels (*Camelus dromedarius*) in Eastern Ethiopia.** *Livestock Research for Rural Development.* 2007; 19(6): 85. ISSN: 0121-3784

Abstract: The study was conducted to asses the effects of non-genetic factors on milk yield and milk composition of camels kept under traditional management conditions in eastern arid and semiarid areas of Ethiopia. The overall mean daily yield and composition of fat, protein, lactose and dry matter of milk were 3.75 litres, 2.47%, 2.67%, 4.67% and 10.44%, respectively. Stage of lactation, parity and season of the year had significant (P<0.01) effects on daily milk yield, composition of fat, protein and dry matter. The percentage composition of lactose remained unaffected by all variables considered. The highest average daily milk yield was recorded during the first 3 months of lactation (4.04+or-0.10 litres), whereas the least was after 9 months of lactation. There was no significant difference in daily milk yield until 9 months postpartum. The percentage compositions of fat and protein were also the highest during the first 3 months of lactation period (3.24+or-0.11 and 2.98+or-0.06, respectively). Similarly, the highest average daily milk yield and percentage composition of protein, fat and dry matter were recorded from camels of 3rd parity (5.43+or-0.19 litres, 5.32+or-0.44, 3.16+or-0.26 and 13.33+or-0.63, respectively). The least milk yield was obtained from camels of parity six. The highest daily milk yield (4.21+or-0.11 litres) was recorded during the wet season as compared to the dry season (3.54+or-0.10 litres). This study indicated that camels are reliable sources of milk in hostile regions of the country with persistent yield and composition throughout most periods of lactation. However, culling strategy of old dams (after parity five in this case) and provision of adequate feed and water during dry season would result in better productivity. Reproduced with permission of CAB.

Descriptors: dromedary camel milk, milk yields, milk composition, lactation stage, lactose levels, milk fat percentage, milk production, milk protein percentage, milk quality, parity,

seasonal variations, wet season, dry matter, dry season, environmental factors, rainy season, Ethiopia, Abyssinia.

2006

Abdurahman, OAS. **Udder health and milk quality among camels in the Errer valley of eastern Ethiopia.** *Livestock Research for Rural Development.* 2006; 18(8): 110. ISSN: 0121-3784
Abstract: Quarter milk samples (n=205) from 53 camels were examined to study the occurrence and causes of mastitis in traditionally managed camels in the Errer valley of eastern Ethiopia and to observe factors affecting udder health. The study revealed tick infestation and lesions on the teats and udder skin 26 (49,1%). Seven (3.3%) camels had blind teats and 5(9.4%) had clinical mastitis. Seventy-seven (37.6%) quarters yielded bacteria. *Staphylococcus aureus*, *Streptococcus agalactiae* and coagulase negative staphylococci were the main organisms isolated. A high proportion (80%) of bacteria positive milk samples had CMT score 2 or more, while a similar proportion (80%) of bacteriologically negative samples showed CMT score 1. Quarters infected with bacteria had significantly higher mean values for somatic cell counts than non-Infected ones log 12.5 and 13.6 respectively. The demographic parameters of age, parity, and lactation stage did not influence the ability to predict whether a quarter was normal, when judged on percentage correctly classified. The significance of the findings in relation to production system, hygiene and public health aspects were discussed. It is concluded that early problem recognition and improved hygienic measures will result in reduced losses due to mastitis and increase the availability of milk for consumption and sale.
Descriptors: dromedary camels, camel milk, mastitis, disease prevalence, disease surveys, California mastitis test, epidemiological surveys, epidemiology, microbial contamination of milk, milk hygiene, milk quality, somatic cell count, *Staphylococcus aureus*, *Streptococcus agalactiae,* Abyssinia, Ethiopia.

Aidoud, A; Floc'h, E le; Houerou, H N le. **Les steppes arides du nord de l'afrique.[The arid steppe rangelands of Northern Africa.]** *Secheresse*. 2006; 17(1/2): 19-30. ISSN: 1147-7806. Note: In French with an English summary.
URL: http://www.secheresse.info
Abstract: The steppes of Northern Africa, located between the annual isohyets of 100 and 400 mm, cover some 630 000 km2 between the Atlantic Ocean and the Red Sea. They are made of a low and sparse vegetation of perennial sub-shrubs and, occasionally, of perennial grass (esparto). The natural land use has been for centuries the nomadic grazing of sheep, goats and dromedaries, together with the shifting cultivation of cereals. This land use model worked out throughout the historical times until the mid-twentieth century in a globally stable society. At present, the main fact is the shrinking of the steppe areas and their occasionally extreme degradation. The consequence is that pastoral production from these rangelands has been characterized by a significant decline over the past five decades. Particularly quick and intense shifts took place under the growing pressure of population growth, which trebled over the past half-century in the five North African countries and increased nine-fold over the century. This population growth generated the expansion of cultivated land and a shift in land management practices which are exacerbated by the impact of more

or less severe periodic droughts. It is, however, difficult to distinguish the long term trends from the temporary impact of interannual fluctuations that are revertible. The confusion between these two concepts fuels the debate. This debate is unclear because of the scant and often unreliable baseline data sources on preexisting situations and for long-term evolutions follow-up. Such data sources (vegetation description, functioning analyses, historical statistical figures, etc.) are on the increase. They lead to a more reliable assessment of the biodiversity and potential productivity of these ecosystems, under the prevalent interannual climatic variability. The objective of the present chapter is to present the current situation in the steppe environments, of their biodiversity, productivity and dynamics but also of livestock performance and of the overall impact of the incurring changes on geographic space, environment and people. We also identify possible remedies to the situation: exclosures, deferred grazing, restoration operations, rehabilitation, agroforestry and silvopastoralism, etc. If the sometimes anarchic utilization of steppe resources leads to profound changes in the environment, one should not, however, overgeneralize the established facts of progressing desertification. Some types of steppe keep a good enough level of resilience that makes their rehabilitation feasible under a rational management. It proves it is important to consider a hierarchical approach involving specialists from the various disciplines concerned (ecology, hydrology, agronomy, pastoralism, livestock husbandry, socioeconomic, etc.).
Descriptors: livestock, camels, sheep, goats,arid zones, biodiversity, climate, desertification, grasslands, recent land degradation, land management, land use, livestock, pastoralism, human population growth, productivity, rangelands, steppes, Northern Africa.

Animal Welfare Information Center (U.S.). ***Zoo and Wildlife Information Resource Guides.*** Animal Welfare Information Center, [Beltsville, MD]: 2006. Note: Title from screen title. "June 2006." System requirements: CD-ROM drive. Contents: Bats; Birds; Elephants; Emus and Ostriches; Ferrets; Old world camels; Opossums; Pandas; South American camelids; Tigers; Zoo Library Directory.
NAL call no: aSF408..Z66 2006
Descriptors: a CD that combines information resources on a number of animals including camelids, camels, all aspects of care, earlier version of this document.

Bhakat. **Calving pattern and neonatal behaviour in Indian dromedary camel.** *Indian Veterinary Journal.* 2006; 83(4): 416-418. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: dromedary camels, birthing, calving, camel behaviors, neonatal behaviors, signs of labor in pregnancy, India.

Daoudi, A; El Allouchi, M; Maassen, C; Sperner, B; Kaufmann, S; Stolle, A. **Beschreibung der rituellen Schlachtung von Dromedaren (*Camelus dromedarius*).[Description of the ritual slaughter of dromedaries (*Camelus dromedarius*).]** *Archiv fur Lebensmittelhygiene.* 2006; 57(5): 159-162. ISSN: 0003-925X. Note: In German with an English summary.
URL: http://www.schaper-verlag.de
Abstract: The practice of ritual dromedary slaughter requires that the animal is first placed in a sitting position. The animal is placed in a sterno-abdominal position with limbs tucked

under the body, facing towards Mecca according to Islamic ritual. Once the animal is in the proper position, the neck is bent back to the left side of the body and the animal is stuck whilst the slaughterer says "Bismillah" ("in the name of Allah"). Following slaughtering, the head and neck are separated from the carcass and skinned. For skinning the carcass, the skin is incised along the back of the animal and the hide is removed beginning dorsally, not ventrally as with other species. This is followed by evisceration of the organs of the thoracic and abdominal cavities. Lastly, the carcass is split into halves and is presented for post-mortem inspection along with the offals. The following article describes the process of dromedary slaughter according to Islamic ritual. Reproduced with permission of CAB.
Descriptors: dromedary camels, ritual slaughter, camel meat, religious dietary laws, slaughter, Islamic ritual.

Dharm Pradeep; Tiwari, GS. **Fatigue assessment of camel in transportation.** *Indian Veterinary Journal.* 2006; 83(9): 982-984. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Three Bikaneri camels of different age and weight groups were selected for an experiment to test fatigue during transportation. Camels were then operated on three draught and work rest cycles. Fatigue score were calculated on the basis of physiological responses and physical symptoms Maximum fatigue score was found in work rest cycle WR< sub>1</ sub> (8 hours work and 5 hours rest) at similar condition of draught whereas it was minimum with work rest cycle WR< sub>3</ sub> (8 hours work and 6 hours rest) at similar condition of draught. Based on this results it may be concluded that the camels exhibited less fatigue symptoms with W< sub>3</ sub> at different draught and duration of work in transportation.
Descriptors: dromedary camels, Bikaneri breed, draft animals, maximum fatigue score, rest, stress, stress response, transport, cart and draft animals, working animals, fatigue cycles.

Di Rocco, Florencia; Parisi, Gustavo; Zambelli, Andres; Vida Rioja, Lidia. **Rapid evolution of cytochrome c oxidase subunit II in camelids (Tylopoda, Camelidae)**. *Journal of Bioenergetics and Biomembranes.* 2006; 38(5-6): 293-297. ISSN: 0145-479X
Abstract: Within cetartiodactyl species, both New and Old World camelids are uniquely adapted to the extremely hot and dry climates of African-Asian territories and to the high altitude cold and hypoxic environment of the whole Andean area. In order to investigate the potential association between these particular adaptations and mitochondrial aerobic energy production, we examined the camelid genes of cytochrome c oxidase subunits I, II, and III and the replacement of amino acids inferred. We found that all subunits had undergone a number of replacements in sites otherwise conserved in other cetartiodactyls. Changes of COXI and COXIII were mainly located in the transmembrane helices of proteins. For COXII, although most of the changes did not occur in sites directly involved in electron transfer, a shift of D by T at 115 position of Old World camelid might modify electrostatic interactions with cytochrome c. COXII also showed an increased relative evolutionary rate respect to other cetartiodactyls compared.
Descriptors: New and Old World camelids, adaptions to hot and dry climates, high altitude

cold and hypoxic environments, mitochondrial aerobic energy production, cytochrome c oxidase subunits I, II, and III, differences found.

Dicko, MS; Djiteye, MA; Sangare, M. **Les systemes de production animale au Sahel. [Animal production systems in the African Sahel.]** *Secheresse.* 2006; 17(1/2): 83-97. ISSN: 1147-7806.
Note: In French with an English summary.
URL: http://www.secheresse.info
Abstract: With over 63 million cattle, 168 million small stock, 6.2 million camels, 3.5 million asses and 1.1 million horses, livestock husbandry is the major renewable resource of the African Sahel. It is also involved in the subsistence and the foundations of the societal values of 20 million livestock owners. The first production objective is milk; hence priority is placed on promoting the milk production channels. Production systems may be subdivided into pastoralists, agropastoralists and sylvopastoralists. These systems underwent profound changes over the last decades due to various events such as the 1970-1980 great drought, the fast growth of human and animal populations and the quick rise of urbanization. These changes have had a tremendous impact on range degradation, the increase of the demand for livestock products, of marketing and on the development of local markets, the moving of pastoralists toward climatically more humid zones, a steady increase in urbanization and structural changes in stock ownership. Reproduced with permission of CAB.
Descriptors: asses,camels, cattle, donkeys, horses, livestock numbers, agropastoral systems, animal husbandry, animal production, factors of livestock production; farming systems, milk production, pastoralism, rangelands, urbanization, agricultural systems, production factors, range pastures, Sahelian region, Sahelian zone, silvipastoral systems, Sahel.

Engelhardt, W von; Haarmeyer, P; Lechner Doll, M. **Feed intake, forestomach fluid volume, dilution rate and mean retention of fluid in the forestomach during water deprivation and rehydration in camels (*Camelus* sp.).** *Comparative Biochemistry and Physiology A, Molecular and Integrative Physiology.* 2006; 143(4): 504-507. ISSN: 1095-6433
Abstract: Camels were deprived of water for 11 days. Before and during water deprivation and during rehydration changes in body weight, feed and water intake were measured. Using the liquid marker Cr-EDTA forestomach fluid volume, mean fluid retention and fluid dilution in the forestomach were estimated. At the eleventh day of water deprivation hay intake had decreased to only 9.6% of controls, dilution rates had decreased to 31%, mean retention time of fluid in the forestomach had increased to 189%. At the end of dehydration flow of saliva of 2 l/h mainly contributed to the still rather high dilution rates. Thereby buffering capacity and flow of fluid into the forestomach for microbial digestion as well as the outflow from the forestomach were maintained. At the beginning of rehydration camels drank 97 l within a few minutes, and animals thereby replaced all the water lost. Following this first huge water intake water is rapidly absorbed from the forestomach, and forestomach volume decreased again to dehydration values. At the third day of rehydration control values were reached again. Although feed intake decreased dramatically during water deprivation, functions of the forestomach can be maintained sufficiently mainly due to saliva inflow. This explains the mostly rapid recovery of camels when water is available again. Reproduced with permission of CAB.
Descriptors: dromedary camels, dehydration experiment, water deprivation, rehydration,

water intake, dilution rate, body weight, feed intake, forestomach, fluid retention, fluid volume measurements.

Franck, SGV; Faye, B; Kane, Y; Diarra, A; Laouali, G; Daouda, H. **Performances de reproduction de la femelle dromadaire (*Camelus dromedarius*) dans la zone pastorale de Zinder (Niger).[Reproduction performances of female dromedary (*Camelus dromedarius*) in extensive breeding at Zinder (Niger).]** *Revue Africaine de Sante et de Productions Animales.* 2006; 4(3/4): 111-116. ISSN: 0851-7002. Note: In French with and English summary.
Abstract: This study was conducted to determine the reproductive performance of camels (*Camelus dromedarius*). 201 female dromedaries from Zinder, Niger were divided into 20 herds and monitored. It was observed that calving period was significant in Manga dromedaries, while calving was spread throughout the year in Azaouak females. The abortion rate was 17.9%. More males were born than females in the Toubou breeds (55.2%), while the opposite was observed in Touareg (44.8%) breed. The mean age of first calving was 2089+or-537 days with no significant differences between Toubou (2158 days) and Touareg (2070 days). The mean calving interval observed was 735+or-179 days. The reproductive performance of the animals were affected by breed, parity, survival and deworming treatment.
Descriptors: dromedarycamels, abortion, age at first calving, breed differences, calving interval, calving rate, reproduction, reproductive performance, sex ratio, Niger.

Gallacher, DJ; Hill, JP. **Effects of camel grazing on the ecology of small perennial plants in the Dubai (UAE) inland desert.** *Journal of Arid Environments.* 2006 Sept; 66(4): 738-750. ISSN: 0140-1963
DOI: http://dx.doi.org/10.1016/j.jaridenv.2005.12.007
NAL call no : QH541.5.D4J6
Abstract: Camel grazing is recognized as a primary cause of ecological degradation in the UAE. A study of perennial plant species <1 m in height was conducted along a fence separating continuously camel grazed land from land in which camels had been replaced by oryx and gazelle species for 5 years (Al Maha). Vegetation regeneration in Al Maha in the absence of camels was considerable on all substrates (gravel, stable sand, and semi-stable sand) but was greatest on the gravel substratum, indicating that ecology in this habitat is most at risk. Observed regeneration was primarily through vegetative reproduction and growth of existing plants, showing that existing species can tolerate heavy grazing. Therefore, an equilibrium grazing model of continuous and reversible vegetation dynamics is most suitable for management of this ecological zone. Species richness was greater in Al Maha due to the greater number of plants, but biodiversity was unaffected. There was some evidence of localized dune stabilization within Al Maha due to increased vegetative cover. Further recovery of vegetation within Al Maha is discussed. This study highlights the need for reduced grazing pressure throughout the Dubai inland desert, and in particular on gravel substrata.
Descriptors: camels, grazing management, deserts, xerophytes, plant ecology, desertification, land restoration, species diversity, vegetation cover, United Arab Emirates.

Ismail, IM; Mourad, M; Abdelsalam, AZE; Bedier, NZ. **Protein polymorphism of some camel breeds in Egypt.** *Journal of Camel Practice and Research.* 2006; 13(2): 103-109. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com
Abstract: Sixty-one camels of approximately the same age group belonging to Fallahy, Magrabi, Sudany and Mowaled breeds were used to measure variations in their plasma protein electrophoretic banding patterns by native gel electrophoresis. The electrophoretic patterns between and within the 4 camel breeds revealed the presence of 7 different fractions, viz. immunoglobulin, post transferring, alpha -globulin, transferrin, beta -globulin, albumin and post-albumin. Specific protein markers for males and females within each breed as well as between camel breeds were observed. Some pairs of breeds were also genetically characterized by specific protein markers, viz. Mowaled and Falahi, Sudany and Falahi and Sudany and Maghraby, which reflected a relationship between intra-paired breeds. Homogeneity ratios were 10.0, 16.7, 31.6 and 20.8% for Maghraby, Sudany, Falahy and Mowaled, respectively. Genetic similarity estimates varied between 0.81-0.88, 0.78-0.92 and 0.66-0.78 for intra-breed males, intra-breed females and as camel breeds, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camels, blood plasma proteins, breed differences, electrophoresis, genetic polymorphism, genetic variation,genotype variations, gamma globulins, immunoglobulins, serum albumin, transferring, Egypt.

Kacskovics, I; Mayer, B; Kis, Z; Frenyo, LV; Zhao YaoFeng; Muyldermans, S; Hammarstrom, L. **Cloning and characterization of the dromedary (*Camelus dromedarius*) neonatal Fc receptor (drFcRn).** *Developmental and Comparative Immunology.* 2006; 30(12): 1203-1215. ISSN: 0145-305X
DOI: http://dx.doi.org/10.1016/j.dci.2006.02.006
Abstract: The full length cDNA of the dromedary neonatal Fc receptor (drFcRn) alpha chain was isolated and found that it is similar to the neonatal Fc receptor (FcRn) of other species with a high overall similarity to ruminant FcRn alpha chains. The drFcRn/Fc contact residues are highly conserved and predicted to bind both conventional (IgG1) and heavy chain (IgG2a, IgG3) antibodies. Using immunohistochemistry, we detected its expression in the hepatocytes and in epithelial cells of portal bile ductuli and also in the mammary gland acini and ducti. Remarkably, Ser313, that was identified to be crucial for apical to basolateral transcytosis, is substituted in the drFcRn alpha chain. The full length of the dog and orangutan FcRn alpha chains was also identified from databases. Analyzing the phylogenetic relatedness of this gene we found that dromedary clustered together with artiodactyls, dog is located between artiodactyls and primates, where the orangutan was branched, reflecting the accepted evolutionary relationships. Reproduced with permission of CAB.
Descriptors: dromedary camels, dogs,antibodies, complementary DNA, IgG, liver cells, immunohistochemistry, mammary glands, phylogenetics, cDNA, epithelial cells, Fc receptors, hepatocytes.

Kuria, SG; Wahome, RG; Wanyoike, MM; Gachuiri, CK. **Effect of mineral supplement on plasma minerals concentration of camels (*Camelus dromedarius*) in Kenya.** *International Journal of Agriculture and Biology.* 2006; 8(2): 168-171. ISSN: 1560-8530
URL: http://www.fspublishers.org/
Abstract: A study was conducted in Ngurunit and Kargi locations of Marsabit district, Kenya to determine the effect of mineral supplementation on plasma minerals concentration

of camels. Two mineral supplements were formulated; one comprising of locally collected, ground bones mixed with locally available natural salt and the other consisted of commercial ingredients. Fifty-nine camels in early lactation were recruited in Kargi and 56 in Ngurunit. Of these camels, 22 were randomly assigned commercial supplement in each site while 12 were put on local supplement in Kargi and 11 in Ngurunit. There were 25 control camels in Kargi and 23 in Ngurunit. Each dam was fed 200 g of supplement daily for 190 days, with blood samples being taken once a month for minerals assay. While the concentration of cobalt and copper was relatively stable, potassium, magnesium and iron exhibited a slight increase. Trends for calcium, sodium, zinc and phosphorus were inconsistent. These results suggested interactions, and that plasma minerals concentration is not a good indicator of dietary mineral content. Reproduced with permission of CAB.
Descriptors: dromedary camels, nutrition physiology, diatary mineral supplements, assays, calcium, cobalt, copper, sodium, magnesium, potassium, zinc, Kenya.

Mochabo, MOK; Kitala, PM; Gathura, PB; Ogara, WO; Eregae, EM; Kaitho, TD; Catley, A. **The socio-economic impact of important camel diseases as perceived by a pastoralist community in Kenya.** *Onderstepoort Journal of Veterinary Research.* 2006; 73(4): 269-274. ISSN: 0030-2465
Abstract: The objective of the study was to assess the socioeconomic impact of camel trypanosomiasis (surra) according to the perceptions of the pastoralists community in Kenya. Four livestock grazing units were conveniently selected and in each of them, three groups of key informants comprising five to eight persons were selected for the participatory exercises. Five camel diseases were listed in order of importance according to their severity and frequency of occurrence including trypanosomiasis, mange, non-specific diarrhoea, tick infestations and haemorrhagic septicaemia. The losses listed as incurred due to the five diseases were: losses in milk, meat, blood, fats and hides, dowry payments, depreciation in sale of animals, losses due to infertility and abortions and losses due to the cost of treatment. It was observed that there was good agreement ($P<0.05$) between the informant groups on the losses incurred as a result of the diseases for all the selected loss indicators. Surra and mange were given high median scores on all the indicators while non-specific diarrhoea, tick infestations and haemorrhagic septicaemia received moderate median scores. It is concluded that the camel plays a central role in the lives of Turkana pastoralists and that surra has a devastating social and economic impact. There is a need for veterinary and policy decision-makers to focus more attention on the control of surra in this arid and semi-arid area of Kenya.
Descriptors: dromedary camels, diarrhea, mange, parasitoses, pastoral society, protozoal infections, trypanosomiasis, *Trypanosoma evansi*, diarrhea, parasitic diseases, parasitic infestations, parasitosis, protozoal diseases, scouring, losses, socio-economic aspects, trypanosomosis, Kenya.

Mohamed, HE. **Factors affecting cortisol status in camels (*Camelus dromedarius*).** *Journal of Animal and Veterinary Advances.* 2006; 5(4): 307-309. ISSN: 1680-5593
Abstract: The objective of this study was to evaluate the concentrations of cortisol in peripheral circulation around parturition and weaning in camels (*Camelus dromedarius*). 10 pregnant Arabi camels aged 8.5 years and at 12 months of pregnancy were kept in shaded areas throughout the experimental period (45 days). Sampling intervals were one week before

parturition, parturition, and one, 3 and 5 days post-parturition. No effect of sex on cortisol plasma level was observed. Cortisol level was 121.6+or-5.4 ng/ml at the day of parturition, but it decreased to 30.1+or-1.9 and 21.9+or-1.0 ng/ml at days 3 and 5 post-parturition, respectively. Cortisol serum level was 37.1+or-1.4 ng/ml one day before weaning and then increased to 48.0+or-1.5 and 69.5+or-1.9 ng/ml at weaning and 3rd day after weaning, respectively. The results showed that following weaning and around parturition, the cortisol status increased, which was regarded as an adaptive measure to harsh desert conditions. Reproduced with permission of CAB.
Descriptors: dromedary camels, young animals, weaning stress, stress response, cortisol, adaptation, hydrocortisone.

Mohammed, I; Hoffmann, I. **Management of draught camels (*Camelus dromedarius*) in crop-livestock production systems in Northwest Nigeria.** *Livestock Research for Rural Development.* 2006; 18(1): 16. ISSN: 0121-3784
Abstract: Camels are increasingly being used as draught animals in northern Nigeria. This study aimed to: assess the feeding management practices of farmers who own camels; formulate an optimal feed ration; and compare the gross margin of camels with that of draught oxen. Interview data were collected in four villages of two local government areas of Sokoto State, Nigeria. The average gross margin of farmers who owned camels exceeded that of farmers owning oxen by 21%. This can be attributed to the limited utilization of oxen for other purposes apart from ridging and weeding. Feeding costs were lower for one camel than for one pair of oxen. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel feeding, costs, draft camels, feeds, gross margins, working animals, draught camels, Nigeria.

Musa, HH; Shuiep, ES; El Zubier, IEM. **Camel husbandry among pastoralists in Darfur, Western Sudan.** *Nomadic Peoples.* 2006; 10(1): 101-105. ISSN: 0822-7942
URL: http://www.berghahnbooks.com/journals/np
Abstract: A summary is presented of a study conducted during 2003 in the Darfur states of western Sudan. The study presents information about nomadic camel owners, types of camels and other animals reared, camel herd structure, purpose of camel rearing, movement during the year, feeding, management, and the economic aspects of camel husbandry (including the marketing of camels and camel products). Reproduced with permission of CAB.
Descriptors: dromedary camels, camel husbandry, camel herd structure, marketing, nomadism, production economics, Sudan.

Musa, HH; Shuiep, ES; Ibtisam, EME; Chen, GH. **Some reproductive and productive traits of camel (*Camelus dromedarius*) in Western Sudan.** *Journal of Animal and Veterinary Advances.* 2006; 5(7): 590-592. ISSN: 1680-5593
Abstract: Some reproductive and productive traits of the one-humped camel (*Camelus dromedarius)* in Western Sudan were studied. The results of reproductive traits presented in this study indicated that the camels conceived and calved throughout the year, and high incidences were observed in the wet-summer season. Age at first oestrus, oestrus cycle and oestrus duration were 39.24+or-5.78 months, 12.29+or-4.09 days and 18.56+or-8.01 h, respectively. Age at first calving, gestation length and calving interval were 52.41+or-7.74

months, 370.28+or-19.06 days and 20.96+or-3.51 months, respectively. Calves were weaned at 275.09+or-24.18 days. Milk yield per day was 9.62+or-3.09 litres during 2.85+or-0.83 milking number per day. Similarly, lactation length was estimated to be 303.98+or-6.03 days, and the peak of milk yield was at 9.09+or-2.09 years. The number of calf per age was estimated to be 12.66+or-2.39. A high mortality rate was observed in the wet-summer season compared to the other seasons. Reproduced with permission of CAB.
Descriptors: dromedary camels, reproductive traits, estrous cycle, age at first calving, calving interval, calving rate, conception rate, gestation period, pregnancy duration, lactation, milk yield, milking rate, mortality, seasonality, Sudan.

Okoti, Michael; Keya, GA; Esilaba, AO; Cheruiyot, H. **Indigenous technical knowledge for resource monitoring in Northern Kenya**. *Journal of Human Ecology.* 2006; 20(3): 183-189. ISSN: 0970-9274
Abstract: This study, which was undertaken in the Northern Kenya pastoral community, was aimed at documenting the various indicators the community use in monitoring the quality of range resources, especially vegetation. It should be noted that livestock production is the main livelihood system in this communities. Data was captured using interviews and focused group discussions with a section of the community members. The study revealed a wealth of knowledge in monitoring of the range resources quality within these communities. Among the two communities, it was evident that they observe livestock behavior, livestock attributes and physical phenomena, as indicators of vegetation quality. Livestock behavior observed could tell when the range conditions were suitable for livestock and when the conditions were unsuitable. Goats' being playful is a common characteristic that indicates that the range conditions are suitable for livestock. Other observable livestock behavior or attributes indicating good range conditions are livestock responding to their names when called increase on milk output; increased mating. Indicators of bad range conditions include: - rough hair on camels; livestock grinding teeth at night; high mice populations, increase in camel flies. Some specific observations are specific to few individuals. This is in the case of judging the suitability of forage by smelling-livestock urine. However these indicators are used to make decisions always when the community migrates from one region to another in search of pastures. Documenting this indigenous knowledge aids in better understanding the reasons behind the decisions made for livestock migration.
Descriptors: goats, camels, migration decisions of nomadic peoples, camel hair, urine odor assessment, milk output, teeth grinding, mating behavior, mice populations, camel fly levels, livestock systems, community assessments of range conditions, etc.

Onjoro, PA; Njoka Njiru, EN; Ottaro, JM; Simon, A; Schwartz, HJ. **Effects of mineral supplementation on milk yield of free-ranging camels (*Camelus dromedarius*) in northern Kenya.** *Asian Australasian Journal of Animal Sciences.* 2006; 19(11): 1597-1602. ISSN: 1011-2367
URL: http://www.ajas.info
NAL call no: SF55.A78A7
Abstract: The effects of different mineral supplementations on the milk yield of free ranging Somali camels in a semiarid region of northern Kenya were investigated during the dry and wet seasons of 2002 and 2003. In phase I, a total of 12 lactating camels were selected at random to form 4 groups of 3 camels each. The first group served as the control and did not

receive mineral supplementation. In addition to the control diet, the other groups received oral doses of minerals over a 60-day period: T1 (P); T2 (high Cu low Co); and T3 (low Cu high Co). The daily milk yield and blood mineral profiles were measured during the wet and dry seasons. The mean daily milk yield increased from 3.4 litre/day to 4.3+or-0.3 and 5.2 litre/day in the dry and wet seasons, respectively. For the phase II of the study, 15 lactating camels were selected at random to form 5 groups of 3 replicates each. The control group did not receive any mineral supplement. The other 4 groups in addition to the control diet, received the following treatments: T4 (common salt); T5 (high Co); T6 (high Co + P); and T7 (low Co + P). Mineral supplement T6 resulted to a significantly higher milk yield (5.4+or-0.5 and 6.5+or-0.7 litre/day) during the dry and wet seasons. Both T6 and T7 diets resulted to significantly higher milk yields than the T4 and T5 diets. During both phases, the blood Ca and P level significantly increased in camels receiving T1, T6 and T7. Animals that received only the trace mineral supplements had lower blood P compared to the ones receiving supplementary P and control. Supplementation of lactating camels with Co and P significantly ($p<0.05$) increased the milk yield. Effect of common salt, commonly given by farmers, on milk yield was insignificant. It was concluded that mineral supplementation to lactating camels was beneficial, and that mineral supplements should include P and Co. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel milk, microelements, mineral supplements, calcium, cobalt, copper, sodium chloride, diets, milk production, milk yield, phosphorus, elements, dry season, wet season, seasonal differences, Kenya.

Parsons, K; Pfau, T; Wilson, A. **Stance time and duty factor during pacing in the dromedary camel (*Camelus dromedaries*).** *Comparative Biochemistry and Physiology Part A Molecular and Integrative Physiology.* 2006; 143(4, Suppl. S): S90. ISSN: 1095-6433. Note: "Annual Meeting of the Society for Experimental Biology, Canterbury, UK; April 02-07, 2006."
Descriptors: dromedary camel, stance duration, pacing movement, pacing gate, locomotor economy.

Raziq, A; Younas, M. **White camels of Balochistan.** *Science International Lahore.* 2006 Jan-March; 18(1): 51-52. ISSN: 1013-5316
Descriptors : dromedary camels, *Camelus dromedarius*, white color, characteristics, distribution, population dynamics of the color form, population trends, Balochistan, Pakistan.

Rubina Akhter; Mirza, SN. **Arid steppes of Balochistan (Pakistan).** *Secheresse.* 2006; 17(1/2): 203-209. ISSN: 1147-7806. Note: In English with a French summary.
URL: http://www.secheresse.info
Abstract: Balochistan is the southwest part of Pakistan with a semiarid to hyperarid Mediterranean-like highland (>1000 m) climate and a steppe vegetation covering 340 000 km2. Rangelands cover 60% of land use, irrigated farming 4% and forest 3%, the remaining being mainly a hyper-arid sandy desert. Range and animal husbandry constitute the bulk of the human livelihood. Most of the herds of sheep, goats and dromedaries are managed in agropastoral transhumant production systems, while sedentary agropastoralism represents some 25% based on cereals and fallows.
Descriptors: sheep, goats, dromedary camels, livestock, human agropastoral systems, camel

husbandry, arid zones, deserts, grasslands, highlands, irrigated conditions, rangelands, steppes, arid regions, range pastures, Pakistan.

Saini, N; Singh, GP. **Effect of weaning on growth performance of camel calves.** *Indian Journal of Dairy Science.* 2006; 59(5): 344-348. ISSN: 0019-5146
URL: http://www.indairyasso.org/current_ijds/jan_2006/dairyman_science.html
Abstract: This study was conducted to investigate the growth performance of camels weaned at 3 months of age compared to those weaned using the traditional system of calf rearing. 14 camels of Bikaneri, Jaisalmeri and Kachchhi breeds at 3 months of age were divided into 2 similar groups. Group I (126.70 kg BW) was weaned and maintained on concentrate mixture and available fodder such as guar (*Cyamopsis tetragonoloba*) phalgati, moth (*Vigna aconitifolia*) chara and groundnut (*Arachis hypogaea*) chara, whereas group II (139.40 kg BW) was kept with the dams to suckle milk and graze. The average daily weight gain over 137 days was significantly (P<0.01) higher in group I (535.03 g/day) than in group II (491.24 g/day). Dry matter intake in weaned calves increased with increase in body weight, and it varied from 1.66-2.25 kg/100 kg body weight with an average of 1.92%. For better growth performance and feed conversion efficiency, camels could be weaned at 3 months of age. Reproduced with permission of CAB.
Descriptors: dromedary camel, milk, suckling, weaning, cluster beans, concentrates, dry matter, feed conversion, feed conversion efficiency, feed intake, fodder, grazing, groundnuts, growth rate, guar, liveweight gain, peanuts, *Arachis hypogaea*, *Cyamopsis tetragonoloba*, *Vigna aconitifolia*, liveweight gains, pasturing, protein feeds.

Saini, N; Ram Kumar; Kiradoo, BD; Singh, N; Bhardwaj, A; Sahani, MS. **Camel rearing practices - a survey study in arid western agro-ecosystem of Rajasthan.** *Journal of Camel Practice and Research.* 2006; 13(2): 179-184. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Camel rearing in the northwestern arid region of Rajasthan, India, was studied in 8 districts in 5 agroclimatic zones of state. Camels were reared based on traditional knowledge by utilizing natural available resources and the main utilities are self domestic use, breeding and selling purpose. Mostly camels were managed on rangelands, community land, restricted controlled pasture lands (gochers or orans-vernacular words). Traditional feeding constituting exclusively grazing plus providing some supplementation of leaves during lean period has shifted to grazing plus providing some additional local fodder to meet the dry matter requirement. None of the respondents provide mineral mixture to their camels. The majority of the camel keepers (60%) feed single type of local grown fodder, whereas 39.0% of the farmers feed mixed dry fodder. Generally, green forage was not offered except by 23.4% of farmers in the Hanumangarh and Sriganganagar districts and Rajgarh tehsil of Churu, mostly from a green belt, who offer green chana fodder to their camels. Concentrate supplementation once a week was done only to debilitated camels (1-2 kg) against scientific recommendation of 2-3 kg/day. Irrespective of season, camels were generally kept in open housing system. Failure of availability of conventional flora and grazing resources due to frequent drought, shrinking of grazing land owing to fast urbanization and restriction imposed by the forest department has forced camel breeders to offer some straw in addition to grazing in the rangeland thus, increasing cost of feed input. Reproduced with permission of CAB.

Descriptors: dromedary camels,agroecological zones, camel breeding, camel feeding, camel health, camel housing, camel production, arid zones, feed supplements, feeds, fodder, pasturing, grazing, camel management, Rajasthan, India.

Sena, DS; Gorakh Mal; Sharma, N; Sahani, MS. **Calf mortality in camels: a report.** *Journal of Camel Practice and Research*. 2006; 13(2): 171-172. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The causes of mortality in dromedary camel calves aged <1 year in India were recorded from 1994-2004. The highest incidence of mortality occurred at 0-3 months, followed by 6 months-1 year and 3-6 months of age. Males had a higher mortality compared to females but was not statistically significant. Bikaneri breed had the highest mortality, followed by Jaisalmeri, Kachchhi and crossbred camels. Causes of death included heat stroke (18.367%), impaction (4.081%), encephalitis (6.122%), enteritis (26.530%), pneumonia (40.816%) and respiratory distress (2.040%). In conclusion, neonatal care of dromedary calves at 0-3 months of age is of utmost importance in order to reduce mortality. Reproduced with permission of CAB.
Descriptors: dromedary camels, calves, young animals, camel diseases, causes of death, etiology, age differences, breed differences, sex differences, epidemiological surveys, epidemiology, India.

Skidmore, JA; Billah, M**. Comparison of pregnancy rates in dromedary camels (*Camelus dromedarius*) after deep intra-uterine versus cervical insemination.** *Theriogenology*. 2006 July 15; 66(2): 292-296. ISSN: 0093-691X
URL: http://www.theriojournal.com/home
DOI: http://dx.doi.org/10.1016/j.theriogenology.2005.11.013
NAL call no: QP251.A1T5
Abstract: The ovarian follicular wave patterns of sixty adult female camels were monitored by serial trans-rectal ultrasound examinations and when the dominant follicle reached 1.3-1.8 cm in diameter they received a single intravenous injection of 20 (So(Bg buserelin, to induce ovulation, and were inseminated with a known number of spermatozoa 24 h later. Ejaculates were collected from the male camels and diluted 1:1 in Green Buffer with 20% egg yolk (v:v) added. Sperm concentration and motility were assessed and a dose of 40, 80 or 150 x 10(6) motile spermatozoa were deposited either just through the cervix into the uterine body or at the tip of the horn ipsilateral with the ovary containing the dominant follicle. Insemination of 150, 80 and 40 x 10(6) spermatozoa into the uterine body resulted in conception rates of 53, 7 and 0%, respectively, whereas insemination at the tip of the uterine horn resulted in conception rates of 43, 40 and 7%, respectively.
Descriptors: dromedary camels, pregnancy rate, ovarian follicles, ovulation, artificial insemination, spermatozoa, dosage, induced ovulation.

Stahl, T; Sallmann, HP; Duehlmeier, R; Wernery, U. **Selected vitamins and fatty acid patterns in dromedary milk and colostrum.** *Journal of Camel Practice and Research.* 2006; 13(1): 53-57. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The aims of this study were to determine the concentrations of vitamins A, E,

B< sub>1</ sub> and C as well as beta -carotene and to evaluate the fatty acid patterns of dromedary milk (*Camelus dromedarius*). Camel milk from different herds in the United Arab Emirates was analysed by HPLC as well as gas chromatographic methods and compared with milk from Holstein-Friesian cows of the same area. 46 dromedary camels served as the source of milk samples. Besides fresh camel milk, pasteurized and lyophilized milks were also analysed to evaluate the influence of these preservation methods on the determined parameters. Colostrum was directly tested after birth and in 5 individuals also during the first week after parturition. Blood samples were tested from the same herds for their vitamin content in order to find an eventual relation between milk and blood levels. Vitamins A, E, B< sub>1</ sub> and beta -carotene were significantly lower in dromedary milk, whereas vitamin C was significantly (5-fold) higher compared to bovine milk. In camel colostrum, fat soluble vitamins and vitamin B< sub>1</ sub> were higher than in mature camel milk, but vitamin C was lower in colostrum. Pasteurization and lyophilization caused only small but significant vitamin losses. The total content of saturated and unsaturated fatty acids was similar in camel and cow milks. The differences in the fatty acid patterns were most evident only in omega-6 and omega-7 fatty acids. In dromedary serum, the vitamins A, B< sub>1</ sub> and C were significantly higher than in cow serum. Vitamin E was significantly higher in bovine serum. Regarding the vitamin content and fatty acid composition, it was concluded that camel milk was a good alternative to cow milk for human nutrition. Reproduced with permission of CAB.

Descriptors: cattle, dromedary camels, lactating females, different herds, camel milk composition, vitamin concentrations, ascorbic acid, beta carotene, colostrum, fatty-acids, retinol, saturated fatty acids, unsaturated fatty acids, vitamin B complex, vitamin A, vitamin A alcohol, vitamin A1, vitamin B, vitamin C, vitamin E, axerophthol, milk preservation, freeze drying, pasteurization, United Arab Emirates.

Szafranska, B; Panasiewicz, G; Majewska, M. **Biodiversity of multiple pregnancy-associated glycoprotein (PAG) family: gene cloning and chorionic protein purification in domestic and wild eutherians (Placentalia) - a review.** *Reproduction, Nutrition, Development.* 2006; 46(5): 481-502. ISSN: 0926-5287. Note: A review article.

DOI: http://dx.doi.org/10.1051/rnd:2006034

Abstract: This review presents a broad overview of chorionic glycoproteins encoded by the Pregnancy-Associated Glycoprotein (PAG) gene family and also serves to illustrate how the recent discovery of the PAG family has contributed to our general knowledge of genome evolution, placental transcription and placental protein expression. The complex and large PAG family is restricted to the Artiodactyla order, although single PAG-like genes have also been identified in species outside the Artiodactyla. The PAGs are members of the aspartic proteinase (AP) superfamily. Unexpectedly, however, some members of the PAG family possess amino acid substitutions within and around the active site that likely render them unable to act as proteinases. This paper summarizes the available information regarding biodiversity of PAG gene expression based on cDNA cloning, mRNA localization studies and the structural organization of the PAG genes with a particular emphasis on PAG promoters. It also compares available data regarding PAG protein purifications, sequencing and their N-glycodiversity. Finally, it discusses the scientific relevance, possible functional roles of the PAGs and describes possible profitable applications related to the detection of PAG proteins in the

blood of pregnant domestic and wild species. Reproduced with permisision of CAB.
Descriptors: pigs, moose, *Alces alces*, dromedary camels, alpacas, Artiodactyla, *Bison bonasus*, bison, buffaloes, cattle, elk, *Cervus elaphus canadensis,* goats, white tailed deer, *Odocoileus virginianus*, pigs, sheep, zebras, zebu, placentas, aspartic proteinases, glycoproteins, biodiversity, complementary DNA, DNA cloning, evolution, exons, gene expression, genes, genomes, introns, messenger RNA, nucleotide sequences, pregnancy, gestation, promoters, transcription.

Vries, D de; Leslie, PW; McCabe, JT. **Livestock acquisitions dynamics in nomadic pastoralist herd demography: a case study among Ngisonyoka herders of South Turkana, Kenya.** *Human Ecology.* 2006; 34(1): 1-25. ISSN: 0300-7839
DOI: http://dx.doi.org/10.1007/s10745-005-9000-2
Abstract: Despite the attention given to social relations in the pastoral literature, the role of livestock acquisitions - additions of livestock to herds through bridewealth, exchanges, gifts, payments, and begging (requests) - in herd build up has usually been assumed to be relatively minor compared to births and relevant mostly when the need for rebuilding arises after major losses. This study is based on an unusual set of data - the reproductive histories of the female cattle, camels, and goats and sheep of 13 Ngisonyoka Turkana nomadic herders in northwestern Kenya, collected in 1987. The article reports on the means by which mothers were added to the herd and how these changed through time. The results suggest that for this population in the late 1970s and 1980s, acquisitions were not merely relevant when disaster struck, but instead were a continuously important component of herd management. The results demonstrate the crucial role of social networks in the survival of Ngisonyoka pastoralists in their non-equilibrial ecosystem. Social exchanges, such as bridewealth, provide a resource security well suited to the challenges of coping with such unpredictable environments. Researchers and policymakers are urged to make efforts to support such indigenous networks if they want nomadic pastoralists to continue their effective use of arid, marginal lands. Reproduced with permission of CAB.
Descriptors: camels, cattle, goats, sheep, acquisition of ownership, case studies, camel herds, interpersonal relations, livestock, livestock numbers, pastoralism, Kenya.

Warda, Mohamad; Gouda, Eman M; El Behairy, Adel M; Mousa, Said Z. **Conserved and non-conserved loci of the glucagon gene in old world ruminating ungulates**. *Zeitschrift fuer Naturforschung Section C- Journal of Biosciences.* 2006; 61(1-2): 135-141. ISSN: 0939-5075
Descriptors: Egyptian buffaloes, camels, sheep, cattle, glucagon gene evolution, comparison genenomic sequence homology and diversification, oligodeoxynucleotide primers, PCR probe, DNA oligomer probes, evolution of the gene, species comparison, variable diversity in Old World ruminating ungulates, variation predominately in camel, oligomer probes to flank whole gene encoding sequence or different intra-gene encoding sequences, same sized band of prepro-glucagon when whole gene encoding sequences, different result with amplifications of different intra-gene loci, variations in the camel vs other ruminants, lack of large intervening introns indicated.

Wernery, U. **Camel milk, the white gold of the desert.** *Journal of Camel Practice and Research.* 2006; 13(1): 15-26. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: New World camelids are not milked, but the milk of Old World camelids is being used for many centuries. The two-humped camel lives in cold climate, hence their milk fat can reach levels of 8% which serves as an energy source for the newborn. The one-humped camel lives in hot climatic zones, hence the fat content is low, but the water content is high. The camel udder possesses 4 quarters, one teat per quarter and 2 teat canals per teat, sometimes even 3. One of the most remarkable features of dehydrated camels is the ability to continue lactation and to secrete milk that is highly diluted with over 90% water content. A temperamental camel cow which does not like or know its milker will simply cease production, but a contented camel can produce milk for a very long period. Globally, the milk productivity of camels is more than 5 times lower than the milk productivity of cattle. The camel's mammary gland possesses at least 8 (4x2) independent milk units. The camels are milked by hand. A pilot camel milking project using bucket milking machines began at CVRL in 2001. A modern camel dairy farm with the intention of milking several hundred dromedaries will be opened in autumn 2006 in Dubai under the name Dubai Camel Dairy Farm (DCDF). Mastitis in camels is rare. Treatment of camel mastitis is carried out parenteral due to the narrow teat canals. No bacteriological standards exist for raw and pasteurized camel milk. Transformation from colostrum to normal milk is reached after 7-10 days. The colostrum of camels is white like normal milk. Duration of milk letdown is very short, about one to two min, therefore milking from both sides is essential. Camels should be milked several times a day. Good milkers can produce 20-30 litres daily. Camel milk is a rich source of proteins with potential antimicrobial and protective activity. Components of camel milk differ considerably from those of ruminants and have strong similarities to those of human. Camel fat contains a higher concentration of long chain fatty acids (C14-C18) than short chain fatty acids, and is therefore healthier. Camel milk contains less vitamin A, B< sub>2</ sub> folic acid and pantothenic acid than cow milk. On the contrary, the content of niacin and vitamin C is remarkably higher than in cow milk. The high concentration of vitamin C and the high water content are the most eminent factors of camel milk. Whey proteins in camel milk are more heat resistant than those of cow milk. The degree of denaturation varies in camel milk from 32 to 35% at 80 degrees C. In cow milk, 70-75% of whey proteins are denatured at this temperature. Pasteurization at 72 degrees C for 5 min reveals only 5-8% losses of camel milk composition investigated. Lactation periods of up to 24 months are known to occur in dromedaries. Camel milk proteins are different to that of cow milk. This may be the reason why no allergies to camel milk proteins are known. Camel milk does not coagulate easily. It passes the acidic stomach undisturbed and reaches the intestines for absorption. Camel milk contains 5 times more vitamin C compared to cow milk. Camel milk contains insulin and is therefore used to treat diabetes mellitus. Camel milk contains medicinal properties to treat different ailments such as autoimmune diseases, allergies, asthma, rash, diabetes, infectious diseases like tuberculosis, stress, peptic ulcers and cancer. It is a booster of the immune system. Camel milk products are consumed commercially as fresh, raw or pasteurized milk and cheese, especially soft cheese in West Africa (caravane made in Mauritania), ice creams with different flavours, milk shakes, puddings (creme brulee and panna cotta), Arabian dish mohabila and susa (North-Eastern Africa) or shubat (Kazakh-

stan) as sour milks. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, lactating camels, milking, camel milk composition, colostrum, medicinal properties, milk products, milk proteins, milk quality, antibacterial properties, fat, fatty acids, immunoglobulins, gamma gabulins, lactoferrin, lactoperoxidase, lysozyme, N acetyl beta glucosaminidase, nicotinic acid, vitamins, whey protein, bactericidal properties, pasteurization, denaturation, heat treatment mammary glands, mastitis, *Arcanobacterium pyogenes,Escherichia coli*, *Pasteurella multocida*, *Staphylococcus aureus*, *Streptococcus agalactiae*.

2005

Abdel Hadi, AA; Wasfi, IA; Elghazali, M; Almahrami, AM; Barezaiq, IM; Alkatheeri, NA; Alhadrami, GA. **Comparison of the effect of *Sporobolus virginicus* and Rhodes (*Chloris gayana*) hay diets on the absorption pattern of phenylbutazone in the camel (*Camelus dromedarius*).** *Veterinary Journal.* 2005 Jan; 169(1): 91-96. ISSN: 1090-0233
NAL call no.: SF601.V484
Abstract: The effect of feeding *Sporobolus* and Rhodes hay on phenylbutazone (4 g) relative absorption was examined in six camels using a two-period, two-sequence, two-treatment crossover design. Serum concentration of the drug was measured by high performance liquid chromatography. The measured values (means +/- SD) for Rhodes and *Sporobolus* hay, respectively, were C(max) 35.59 +/- 22.36 and 36.55 +/- 18.99 microgram/mL, T(max) 26 +/- 2.53 and 26.3 +/- 1.97 h and AUC(0-72 h) 1552 +/- 872.6 and 1621 +/- 903.6 microgram h/mL. Broad plateau concentrations of phenylbutazone in serum were observed between 12 and 36 h. There was no significant difference in any parameter between the two feeding regimens. Multiple peaks in serum concentration-time curve were observed, regardless of the type of grass available to and the animals prior to drug administration. It was concluded that the phasic absorption of phenylbutazone was a particular feature of hay feeding in camels, and the *Sporobolus* hay can be fed to camels without any effect on the rate and extent of phenylbutazone absorption compared to Rhodes grass hay.
Descriptors: camels, phenylbutazone, pharmacokinetics, hay, *Sporobolus virginicus*, *Chloris gayana*, animal feeding, nutrient and drug interactions, blood serum testing.

Abdel Rahman, MA; Mosaad, GM. **Effect of feed and water deprivation on nutrient digestibility, behavioural and metabolic patterns of one humped camel (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal.* 2005; 51(105): 58-79. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: Six-year-old one humped camels (n=5), 550 kg, were used in this investigation. Animals appeared to be clinically healthy and parasitological examination revealed no gastrointestinal infections. The five animals forming one group were used in four trials alternating in intentional testing sequence. Trial one was used as a control and animals were fed for 7 days with the control diet. Trial one was followed by three trials of successive periods of feed and water deprivation (trials 2, 3, and 4). Each period of deprivation was interrupted by a phase of 4 days refeeding. During the feeding period, all animals were fed as group on commercial concentrate mixture (1.5 kg/head/day), barseem and wheat straw ad libitum. In

addition, additives were added daily to the concentrate mixture at a level of 0.14 kg/head/day. Animals were cleaned periodically to prevent them from eating their dung. On the last day of all the trials, experimental camels were examined clinically to determine their health status. Dry matter and water intake as well as changes in the body weight were recorded. Changes in the digestibility of different nutrients after different periods of deprivation were also estimated. Moreover, blood serum was analysed for some biochemical parameters. Ingestive behaviour of the experimental camels was recorded within the first hour on the last day of the control and the first day of refeeding periods. The obtained results revealed that prolonged deprivation of food and water appeared as a stress factor on camels with a clear and obvious effect on their health status, nutrient digestibility, water intake, body weight, some behavioural and biochemical parameters. This suggests that any prolonged water and food deficit among housed camels must be corrected. Reproduced with permission of CAB.
Descriptors: dromedary camels,blood serum, diet, digestibility, dry matter, feed intake, metabolism, nutrients, plane of nutrition, refeeding after starvation, stress factors, water deprivation, water intake.

Andrews, Peter; Whybrow, Peter. **Taphonomic observations on a camel skeleton in a desert environment in Abu Dhabi**. *Palaeontologia Electronica*. 2005; 8(1): 1-17. ISSN: 1094-8074
URL: http://palaeo-electronica.org/2005_1/andrews23/andrews23.pdf
Abstract: A camel skeleton in a desert environment in Abu Dhabi was monitored for 15 years to record stages of weathering, dispersal, carnivore action and trampling in this extreme environment. Weathering was substantially less rapid than that recorded in tropical environments, being slower both in inception and in later development. Skeleton dispersal was mixed, with a core group of ribs and vertebrae remaining close to the death site, but individual bones being traced for up to 60 m and many disappearing altogether. Scavenging took place, and the size of tooth marks indicated foxes and jackals. Trampling was the major source of breakage of bones, most of which were too robust for small carnivores like foxes and jackals to break.
Descriptors: dromedary camels, taphonomy, weathering of a modern camel skeleton, desert environment, scavenging and bone dispersal, foxes and jackels teeth marks, trampling broke bones, United Arab Emirates, Abu Dhabi.

Baars, RMT; Kebebew, T. **Milk production performance of pastorally managed camels in eastern Ethiopia.** *Tropical Agriculture*. 2005; 82(3): 197-203. ISSN: 0041-3216
NAL call no: 26 T754
Abstract: Milk production of 30 lactating camels belonging to 1 herd of 100 heads was monitored during 19 months from March 1996 to September 1997 in eastern Ethiopia. The effects of season of calving, parity, and calf survival up to weaning on mean daily yield, peak yield, total lactation yield, lactation length, days open, and calving interval were assessed. The least square means (+or-standard deviation) of the daily, peak, and lactation yield were 7.5+or-0.5, 11.5+or-0.5, and 2104+or-97 L, respectively. The least square means of lactation length, days open, and calving interval were 282+or-10, 199+or-13, and 573+or-14 days, respectively. All parameters were significantly ($P<0.05$) affected by the season of calving. The maximum lactation yield was observed for camels in the third and fourth lactations. The lactation curves had a typical shape, although less pronounced for camels that calved during the

long dry season. Camels that calved in the long wet season and older camels showed a lower persistency. Camels whose calves died before weaning showed a significantly higher yield than camels whose calves stayed alive. The fat, protein, casein, total solids, and solids non-fat were 39+or-4, 29+or-3, 23+or-2, 131+or-6, and 92+or-6 g kg-1, respectively. They were all significantly affected by parity and month of lactation. It was concluded that during the dry season, the herd produced a substantial amount of milk for the pastoralists. Reproduced with permission of CAB.
Descriptions: dromedaries, camel milk, casein, lactation curve, lactation duration, milk composition, milk fat, milk production, milk protein, milk yield, parturition, parturition interval, performance, seasonal variation, seasonality, seasons, solids not fat, survival, total solids, butterfat, milk constituents, seasonal changes, seasonal fluctuations, Ethiopia, Abyssinia.

Brey, F; Faye, B. **The camel and society.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 3-12. ISBN: 1586034731
Descriptors: dromedary camels, domestication, adaptation to arid lands, animals of the deserts, camel anatomy, camel physiology, camel behavior, camel meat, camel milk, camels in circuses and zoos, culture and camels, human societies, leisure, modernization, social behavior.

Cairo University Faculty. **Biotechnology and Animal Wealth Development. Proceedings of the 8th Scientific Conference, Giza, Egypt, 17-19 April.** *Veterinary Medical Journal Giza.* 2005; 53(2(1)): 1-444. ISSN: 1110-1423
Abstract: This proceedings contain 22 various topics from different experts and animal scientists of various fields. The major topics covered are: animal genetics and chromosomal aberrations viral nucleotide sequencing; bacterial drug resistance; immune response and immunity; vaccine efficacy and development; probiotics; bacterial diseases; diagnosis and diagnostic technique; growth promoters; virology; pathogenesis; immunology; viral diseases and drug therapy. Some of the topics also discuss animal physiology and nutrition in relation to reproductive performance, food chemistry and toxicology. The animals studied were sheep, goats, buffaloes, cattle and camels. Tables, graphs and pictures are also presented in each article. The topics are intended for veterinarians, animal scientists, epidemiologists, biologists, researchers and students. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, buffaloes, goats, sheep, animal nutrition, animal physiology, bacterial diseases, chromosome aberrations, chromosomes, diagnosis, diagnostic techniques, disease control, disease prevention, drug resistance, drug therapy, feed additives, growth promoters, immune response, immunity, immunization, immunology, nucleotide sequences, nucleotides, pathogenesis, probiotics, reproductive performance, toxicology, vaccine development, viral diseases, growth stimulants, bacterial infections, viral infections, immunological reactions, Egypt.

Chaibou, M; Faye, B. **Fonctionnement des elevages camelins de la zone periurbaine d'Agadez au Niger: enquete typologique. [Herding strategies of camel husbandry in Agadez suburban area in Niger. Typological survey.]** *Revue d' Elevage et de Medecine Veterinaire des Pays*

Tropicaux. 2005; 58(4): 273-283. ISSN: 0035-1865. Note: In French with summaries in English and Spanish.

Abstract: Camel husbandry relies on natural forage resources, which are subjected to irregular rainfall that are poorly distributed in time and space. Mobility is one of the strategies used by herders to utilize these resources. However, it has been a while since socioeconomic and climatic changes and demographic growth and urbanization have changed the rules of herd management. Know-how of dairy farm management is essential for the development of a dairy processing unit in Agadez, whose main activity focuses on camel milk transformation. To determine the various herd management types in suburban Agadez, 100 camel herders were surveyed. Analysis of the data obtained on camel herds helped distinguish three main herd types, which were differentiated on the bases of feeding practices, herders' mobility and a marked preference of some herders for a particular area for socio-historical and ecological reasons. The first group of herders were sedentary, owned an average-sized herd used supplements and sold camel milk. The second group mostly used transhumance during the rainy season; some herders used supplements but almost none sold milk. Herders in the third group owned large herds and regularly practiced nomadism. Milk sales became a more common practice through the special contacts established by some of the producers in this group with the dairy processing unit. Herd size and composition and forage and water resources were the main factors that determined herd movement. Reproduced with permission of CAB**.**

Descriptors: dromedary camels, agricultural systems, camel feeding, camel husbandry, camel milk, farming systems, livestock numbers, management, milk, milk marketing, milk production, nomadism, pastoralism, surveys, transhumance, Niger.

Cherzekov, A; Saparov, G. **The milk productivity of the camel Arvana breed and its use.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 215-220. ISBN: 1586034731

Abstract: In Turkmenistan, the Arvana camel has been selected for different purposes, especially for milk production. Some lines of camels were selected in the state farm. Its milk productivity can be high and can reach more than 2500 kg of milk in one lactation. The milk production is higher in spring. Camel milk has medical and nutritional properties. Camel milk processing into local traditional products is widely done in the country. Reproduced with permission of CAB.

Descriptors: dromedary camels, Arvana breed, breed uses, selection for breeding, lactation duration, milk composition, milk production, camel milk products, camel milk yields, seasonality, Turkmenistan, Central Asia.

Chilliard, Y; Delavaud, C; Bonnet, M. **Leptin expression in ruminants: nutritional and physiological regulations in relation with energy metabolism.** *Domestic Animal Endocrinology.* 2005; 29(1): 3-22. ISSN: 0739-7240. Note: "The Fifth International Conference on Farm Animal Endocrinology, Budapest, Hungary. July 4-6, 2004."

DOI: http://dx.doi.org/10.1016/j.domaniend.2005.02.026

Abstract: Leptin, mainly produced in adipose tissue (AT), is a protein involved in the central and/or peripheral regulation of body homeostasis, energy intake, storage and expenditure,

fertility and immune functions. Its role is well documented in rodent and human species, but less in ruminants. This review is focused on some intrinsic and extrinsic factors which regulate adipose tissue leptin gene expression and leptinemia in cattle, sheep, goat and camel: age, physiological status (particularly pregnancy and lactation) in interaction with long-term (adiposity) and short-term effects of feeding level, energy intake and balance, diet composition, specific nutrients and hormones (insulin, glucose and fatty acids), and seasonal non-dietary factors such as photoperiod. Body fatness strongly regulates leptin and its responses to other factors. For example, leptinemia is higher after underfeeding or during lactation in fat than in lean animals. Physiological status per se also modulates leptin expression, with lactation down-regulating leptinemia, even when energy balance (EB) is positive. These results suggest that leptin could be a link between nutritional history and physiological regulations, which integrates the animal's requirements (e.g., for a pregnancy-lactation cycle), predictable food availability (e.g., due to seasonal variations) and potential for survival (e.g., body fatness level). Reaching permissive leptin thresholds should be necessary for pubertal or postpartum reproductive activity. In addition to the understanding of leptin yield regulation, these data are helpful to understand the physiological significance of changes in leptin secretion and leptin effects, and how husbandry strategies could integrate the adaptative capacities of ruminant species to their environment.

Descriptors: dromedary camels, cattle, dairy cows, sheep, ewes, goats, ruminants, pregnancy, lactation, body fat, diet energy metabolism, feed intake, gene expression, hormones, leptin, photoperiod and seasonal changes, reviews.

Chilliard, Y; Bengoumi, M; Delavaud, C; Faulconnier, Y; Faye, B. **Body lipids and adaptation of camel to food and water shortage: new data on adipocyte size and plasma leptin.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 135-145. ISBN: 1586034731

Abstract: The ability of camels to cope with food or water shortage is exceptional. This can be attributed to several mechanisms of adaptation, including mobilization of body fat reserves during underfeeding and regeneration when food is available. In camel, the adipose tissues are mainly located in the hump (external) and around the kidney (internal perirenal fat, PF) and consist mainly of cells able to store lipids (adipocytes). However, the measurement of adipocyte size is scarcely performed, and no data are available on the variations of plasma leptin, a hormone secreted by adipocytes in mammalian species and can play a major role in the regulation of energy homeostasis. The aim of this paper was to review recently published and unpublished data from 3 experiments conducted jointly by 3 laboratories on the variations of adipocyte size/number and of plasma leptin in camels, as well as the nutritional and physiological factors which regulated them. Recent experiments showed that the mean adipocyte size was similar between the hump and PF, and was 100-700 picoliters in 70 adult male or female camels. These were in the range of values observed in cattle and sheep. Hump or PF weights were positively correlated and better explained by adipocyte size than number. Hump adipocyte size was positively correlated to hump height-hemicircumference and to hump lipid content. Hump biopsies during experiments with different levels of food or water allowance showed that adipocyte size decreased during a 2-month underfeeding, and this decrease was more marked when camels were previously overfed, whereas adipocyte

size was unaffected by 3 weeks of water deprivation. However, dehydration increased fat mobilization, with an increase in plasma nonesterified fatty acids and a decrease in hump lipid content. A radioimmunoassay was developed for camel leptin using antibodies raised against sheep leptin. The plasma leptin concentration was 2-9 ng/ml and positively correlated to hump lipid content or adipocyte size, but less closely than in cattle. It was unaffected by underfeeding and overfeeding, contrary to what was observed in cattle and sheep. Plasma leptin increased steadily (+20%) during 3 weeks of water deprivation and returned rapidly to the control level after 6 h of rehydration. Further studies would determine the role of leptin in the adaptation of camels to desert conditions. Reproduced with permission of CAB.
Descriptors: camels, physiological adaptions to stress, food and water shortage adaptions, overfeeding, rehydration, underfeeding, water deprivation, adipocytes, adipose tissue, body fat, dehydration physiological, fat mobilization, fatty acids, leptins, lipids, fat cells, overnutrition.

Dereje, M; Uden, P. **The browsing dromedary camel. I. Behaviour, plant preference and quality of forage selected.** *Animal Feed Science and Technology.* 2005 June 24; 121(3-4): 297-308. ISSN: 0377-8401
Descriptors: dromedaries, browsing, forage quality, dry season, wet season, seasonal variation, livestock feeding, animal age, gender differences, adult animals, young animals. grazing, resting periods, rumination, walking, *Opuntia*, *Acacia brevispica*, crude protein, feed composition, tannins, digestibility, in vitro studies, Ethiopia.

Dereje, M; Uden, P. **The browsing dromedary camel. II. Effect of protein and energy supplementation on milk yield.** *Animal Feed Science and Technology*. 2005 June 24; 121(3-4): 309-317. ISSN: 0377-8401
Descriptors: dromedaries camels, browsing, feed supplements, protein supplements, dietary energy sources, lactation, milk yield, camel milk, livestock feeding, feed concentrates, protein concentrates, corn meal, *Arachis hypogaea*, dry season, wet season, seasonal variation, milk fat, milk protein percentage, crude protein, plant byproducts, grazing, nutritive value, Ethiopia.

El Khasmi, M; Fouad Riad; Abdallah Safwate; El Abbadi, N; Mohamed Farh; Faye, B; Coxam, V. **La chamelle allaitante face au stress calcique: une fonction endocrine adaptee aux conditions desertiques.[Lactating camels and calcic stress: adaptability of the endocrine function to desert conditions.]** *Secheresse*. 2005; 16(4): 261-267. ISSN: 1147-7806. Note: In French with an English summary.
URL: http://www.secheresse.info
Abstract: The physiological adaptation of lactating camels to desertic conditions involves remarkable endocrine regulation. 1,25dihydroxyvitamin D [1,25(OH)2D] and 25hydroxyvitamin D [25(OH)D] levels in camel blood plasma are 10-15 times higher than in ovine or bovine plasma. During the first days of lactation, plasma 1,25(OH)2D; 25(OH)D; somatomedine C (IGF-I) and osteocalcin concentrations are high, whereas those of thyroid hormones are low. These results suggest an accelerated bone turnover, and a plausible contribution to calcic homeostasis in spite of mammary calcium transfert. The colostrum is acid and rich in calcium, phosphorus, magnesium, parathormone-related peptide (PTHrP), 25(OH)D, thyroxine, and IGF-I. 1a,25(OH)2D3 increases calcium and phosphorus levels in

plasma and milk in lactating camels, and intestinal calcium absorption in their newborns. In the latter, PTHrP enhances postprandial calceamia and phosphateamia, and intestinal xylose absorption.

Descriptors: dromedary camels, desert animals, physiological adaptation, desert climate, arid climate, arid lands, blood chemistry, lactation, camel milk, colostrum, calcium, magnesium, phosphorus, endocrine system, hormone secretion, insulin like growth factor, intestinal absorption, magnesium, osteocalcin, peptides, somatomedin, stress, thyroid hormones, thyroxine, vitamin D, xylose, somatomedin C, sulfation factor, sulphation factor, wood sugar.

El Kassas, MAM. **The Bedouin farmer's knowledge of the technical recommendations of camels breeding in two villages in El-Sharkia and Matrouh governorates.** *Egyptian Journal of Agricultural Research.* 2005; 83(3): 1457-1481. ISSN: 1110-6336. Note: In Arabic with an English summary.

Abstract: This study aimed at determining the level of farmers' knowledge of some technical recommendations of camels breeding in two villages of EI-Sharkia and Matrouh governorates, identifying of the farmers' attitudes regarding the camels breeding, identifying the problems facing those farmers, finding the suggested solutions of those problems and finally; determining the relationship between farmers' knowledge degrees of these recommendations as a dependent variable and some studied independent variables. 96 respondents were randomly selected from camel's breeders which have 3 camels or more, whereas the sample contains 46 farmers from Elrowysat village in Elhamam district and 50 farmers from Eltahawia village in Belbis district (representing approximately 25% form the population). Data were collected through February and March 2004 by personal interviews by using the pretested questionnaire. Furthermore; data were analysed statistically by using the frequencies, means, standard deviation, simple correlation coefficient and multiple regression (step wise). The main findings of this study were: 1 - About 77% of the respondent farmers have positive and moderate attitudes towards the camel's breeding. 2 - There was a significant positive relationship between farmers' knowledge degrees as a dependent variable and the number of camels and the attitude towards camels breeding at 0.01 level. 3 - There is a significant relationship at 0.01 between farmers' knowledge as a dependent variable and farmers' education, the number of camels, average of daily production and the attitude degree towards camels breeding. And between the degree of experience at 0.05 in the Eltahawia village. 4 - Two independent variables the degree of education and the number of camels were contributed positively on the explanation of the dependent variable's variance in the Elrowysat village whereas the degree of education was contributed positively on the explanation of the dependent variable's variance in the Eltahawia village. Reproduced with permission of CAB.

Descriptors: dromedary camels, breeding programs, farmers' knowledge, farmers' attitudes, selection of animals for breeding, technical training, Egypt.

Farah, Z; Younan, M. **Camel dairy in Eastern Africa: present state and future perspectives.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 173-180. ISBN: 1586034731

Abstract: There are about 17 million camels in the world. Of these, 13 million are found in Africa and 4 million in Asia. Of this estimated world population, 15 million are believed to

be one-humped dromedary camels (*Camelus dromedarius*) and 2 million are two-humped (*Camelus bactrianus*). Approximately 11 million dromedaries, representing two-thirds of the world's camel population, are in the arid areas of Africa, particularly in Northeast Africa. In many arid areas, camels play a central role as milk suppliers. In absolute terms, the camel produces more milk and for a longer period of time than other species maintained in the same environment. Milk yields per day vary from 3.5 kg for animals under desert conditions up to 18 kg for animals in irrigated land. In the context of advancing urbanization, camel milk is increasingly commercialized in the informal market in urban areas. Besides being fresh, camel milk is often sold and consumed in the form of fermented milk. The milk is of poor hygienic quality due to the use of unclean containers, long transport and high ambient temperatures. This results in a potentially high health risk to the public through spread of zoonotic infections and food poisoning agents. Due to increasing camel milk consumption in urban and pre-urban areas, there is a growing interest in the introduction of appropriate conservation and storage methods to improve the hygienic safety and shelf life of the commercialized milk. This paper discusses the present limiting factors for building modern camel dairies and possible options for improvement. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel dairies, milk production, milk yield, improving hygienic quality of camel milk products and marketing, camel milk composition, camel butter, casein, cheeses, fermented milk products, commercialization, cultured milks, milk contamination, heat treatment, lactoperoxidase, milk composition, whey protein, East Africa.

Faye, B; Esenov, P. ***Desertification Combat andFood Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.*** IOS Press, Amsterdam. 2005; 225 pp
Abstract : This book gives an overview of the status of camel production, development of camel products and maintenance of animal productivity in order to satisfy human requirements both in quantity and quality. The workshop contributes to the exchange between scientists in order to allow access to new approaches and methodologies by all desert and camel scientists in the involved countries (Western European countries, Mediterranean countries and Central Asian Republics). The 4 papers presented in the plenary sessions discuss the new trends in camel sciences, desertification in Central Asian countries, Arvana breed camel and the association between camel and society. A total of 14 papers give emphasis on desertification, selection, breeding and diseases of camels. Camel keeping and productiveness are discussed in 16 papers. Moreover, recommendations are given. Reproduced with permission of CAB.
Descriptors: desertification, desert animals, domestication, dromedary camels, Bactrian camels, camel production, pasteurizing, grazing behaviors, reproductive performance, selective camel breeding, camel genetic resources, camel-based products, camel milk production, camel milk composition, camel milk products, sour milk, lactoferrin, leptin, lipids, fiber products, fleece, wool, adipocytes, disease prevention, infectious-diseases, mycoses, probiotics, therapy.

Faye, B. **Productivity potential of camels.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 127-134. ISBN: 1586034731
Abstract: It is accepted that camel has the ability to produce more milk than cow in similar

conditions. However, the camel milk productivity is not well known. Data from the literature are scarce and mainly from observations in research stations. Data are more rarely from pastoral areas, where performance monitoring is uncommon. Elsewhere, the data are not homogeneous from one author to another with regards to mean daily yield, total yield per lactation and herd average. Therefore, the comparisons are not easy. Furthermore, there is a high variability of reported productions, which leads to suppose a potential for the selection on that criterion. This selection is possible but rarely achieved except in Soviet Union for dromedary and Bactrian camels. The world production of camel milk is officially estimated to be 1.3 million tonnes in 2002. However, according to the high level of self-consumption and of the individual potential, this production can probably be higher (i.e. 5.4 millions tonnes). The individual production varies between 1000 and 12000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is quite variable (from 8 to 18 months in general), but longer than that for dairy cattle in similar conditions. The feeding and seasonal conditions have an impact on performance. Some intensified systems occurring in many places showed good prospects in camel milk production to supply populations from arid lands.
Descriptors: dromedary camels, Bactrian camels, camel milk, dairy performance, lactation curve, lactation duration, milk consumption, milk production, milk supply, milk yield, seasonality, selection, genetic variation, genotypic variability, Africa, Asia.

Faye, B. **Camel and desert: new trends of the camel sciences.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 3-12. ISBN: 1586034731
Descriptors: dromedary camels, racing camels, disease surveillance, adaptation, camel reproduction, animal models, camel production, camel used in arid lands ecosystems, camel based products, camel meat, camel milk, camel wool, desertification, disease control, disease surveys, immunology, metabolism, pharmacology, trends.

Faye, Bernard; cEsenov, P. ***NATO Advanced Research Workshop on Desertification Combat and Food Safety (2004 : Ashkhabad, Turkmenistan). Desertification Combat and Food Safety.*** IOS Press, Amsterdam; Washington, DC: c2005. Note: NATO science series. Series I, Life and behavioural sciences, 1566-7693; v. 362. ISBN: 1586034731. "Proceedings of the NATO Advanced Research Workshop on Desertification Combat and Food Safety, 19-21 April 2004, Ashgabad, Turkmenistan". Contents: Camel and desert : new trends of the camel sciences / Bernard Faye; Desertification in the Central Asian countries / I.S. Zonn; Camels of the Arvana breed : history, modern state, and perspectives for the development / B. Sopyev, G. Saparov, and O. Annamukhammedov; The camel and society / Franethcois Brey and Bernard Faye; Camel : history of its domestication / H. Yusupov; Participatory approaches to using the camel in combating desertification / Ilse Kohler-Rollefson and Hanwant Sing Rathore; The current status of the wild Bactrian camel / John Hare; Environmental education and public awareness : valuable tools in combating desertification / Kathryn Rae; Desertification and camel-breeding in Kalmykia (Russian Federation) / E. Gabunshchina and L. Dzhabrueva; Realization of the National Action Program to Combat Desertification in Turkmenistan / Muhamet Durikov and Jamal Annaklycheva; Diseases of camels, their preventive maintenance and treatment / B. Sopyev, B. Divanov, and C. Charyev; The most

important infectious diseases in camelids / U. Wernery; Fungal infections of camelids / Falah K. Al-Ani and Jerry Roberson; Role and method of advising for producers in natural hardship conditions / Murat Aitmatov .. [et al.]; Factors affecting reproductive performance of camels at the herd and individual level / Ahmed Tibary, Abdelhaq Anouassi, and Abdelmalek Sghiri; Assisted reproduction in dromedary camels / J.A. Skidmore and M. Billah; Camel genetic resources and ways of camel breeding products use for population of Kazakstan arid areas / A. Tasov and N. Alybaev; Productivity potential of camels / Bernard Faye; Body lipids and adaptation of camel to food and water shortage : new data on adipocyte size and plasma leptin / Y. Chilliard .. [et al.]; Standards for camel milk / Uzi Merin .. [et al.]; Modern dairy products from traditional camel herding : an experience in Mauritania / Nancy Abeiderrahmane; Lactoferrin of camel milk of Kazakhstan / G. Konuspayeva .. [et al.]; -- Artificial nursing of camel calves : an effective technique for calves' safeguard and improving herd productivity / T. Khorchani, M. Hammadi, and M. Moslah; Camel dairy in eastern Africa : present state and future perspectives / Zakaria Farah and Mario Younan; Influence of feeding on camel milk components / Donata Cattaneo .. [et al.]; -- Probiotic properties of a sour-milk product : shubat from the camel milk / A. Serikbayeva .. [et al.]; The effectiveness of the people treatment with camel chal / T. Khodzhageldyev and B.G. Khodzhakuliyev; Development of products for child nutrition and for medical and prevention purposes on the base of camel milk / Yuri Aleksandrovich Sinyavskiy; Camel milk production and transformation in Sub-Saharan Africa / Mohammed Bengoumi, Gilles Vias, and Bernard Faye; Pasture ration of Arvana camels in desert pastures / H. Khanchaev; Meat productivity of the camel Arvana breed and ways to increase it / G. Saparov and O. Annageldiyev; The milk productivity of the camel Arvana breed and its use / A. Cherzekov and G. Saparov; Wool productivity and quality of fleece in the camel Arvana breed / O. Annageldiyev, G. Saparov, and M. Atayeva. Reproduced with permission of CAB.

Field, C; Rushton, J; Viscarra, R; Urquieta, B; Salem, HB. **African camels and South American camelids.** In: E. Owen; A. Kitalyi; N. Jayasuriya; T. Smith. (Editors). *Livestock and Wealth Creation:-Improving the Husbandry of Animals Kept by Resource Poor People in Developing Countries.* Published by Nottingham University Press, Nottingham, UK. 2005; 411-432. ISBN: 1904761321

Descriptors: *Camelus,* dromedaries, alpacas, guanicoes, vicunas, llamas, camelid diseases camelid feeding, camelid health, camelid physiology, camelid products, camelid meat and milk products, camelid meat production, metabolism, reproduction, geographical distribution, Africa, South America.

Gabunshchina, E; Dzhabrueva, L. **Desertification and camel-breeding in Kalmykia (Russian Federation).** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 49-54. ISBN: 1586034731

Descriptors: Bactrian camels, dromedary camels, desertification, adaptation to arid grasslands, animal breeding, camels-based products, camel meat, camel milk, wool, Russia.

Getnet, AM; Abebe, W. **The influence of late pregnancy and excitement on blood parameters of Issa type dromedaries in Eastern Ethiopia.** *Israel Journal of Veterinary Medicine*. 2005; 60(4): 117-120. ISSN: 0334-9152

URL: http://www.isrvma.org/TextPage.aspx?ID=25

Abstract: This study was conducted in and around the Dire Dawa administrative council in eastern Ethiopia to determine the influence of late pregnancy and excitement on blood values of Issa type dromedaries. Blood values were determined using standard haematological methods. An improved Neubauer haemocytometer was used to determine erythrocyte (RBC) and leukocyte (WBC) counts. Sahli Helling's and microhaematocrit methods were used to determine haemoglobin (Hb) and haematocrit (PCV) values, respectively. Mean blood values found for camels at the stage of late pregnancy were: RBC=7.38+or-0.36 mil/ micro litre, PCV=26.46+or-1.02%, Hb=12.6+or-0.48 g% and WBC=14.7+or-1.66x103/ micro l. RBC, PCV, Hb and total WBC were higher compared with non-pregnant animals. An increase in the values of RBC (1.88 mil/ micro l), total WBC (1.4x103/ micro l), PCV (2.15%) and Hb (1 g%) were recorded for excited camels compared to those that were in a non-destabilized state. The Wintrobe indices of erythrocytes and the differential counts of leukocytes were also calculated and the influences due to these physiological phenomena are discussed. These results show that late pregnancy and excitement affect the blood values of dromedaries. Thus, care has to be taken during interpretation of blood values for disease diagnosis. Reproduced with permission of CAB.

Descriptors: dromedary camels, erythrocyte count, hematocrit, hematology, hemoglobin, leukocyte count, pregnancy, stress, Abyssinia, Ethiopia.

Getnet, AM; Abebe, W; Mekonnen, H. **Hemogram of Issa type dromedaries in eastern Ethiopia.** *Online Journal of Veterinary Research*. 2005; 9(1): 48-56. ISSN: 1328-925X

URL: http://www.comcen.com.au/~journals/camelabs2005.htm

Abstract: Hemograms were conducted on 130 normal Issa camels from Dawa, Eastern Ethiopia. Mean red blood cell (RBC) count, hemoglobin (Hb) and packed cell volume (PCV) were 7.49 mil/ micro l, 13.04 g% and 25% and mean corpuscular volume, hemoglobin concentration and hemoglobin were 35.26 fl, 51.21% and 18.1 pg respectively. Mean total white blood cell count, neutrophils, lymphocytes, eosinophils, monocytes and basophils were 14.2x103/ micro l, 7x103/ micro l, 6x103/ micro l, 0.72x103/ micro l, 0.54x103/ micro l and 0.06x103/ micro l respectively. Male camels were found to have significantly higher ($P<0.05$) PCV, Hb and RBC count than females, females on the other hand showed higher total WBC count ($P<0.05$) than males. The peak RBC and WBC counts were obtained in the age group 6-10 years. Compared to cattle, these values are higher owing to the unique adapted physiological features of camel. PCV, Hb concentration and RBC count are positively correlated. The coefficients of correlation computed were 0.4 for erythrocyte count and PCV, 0.46 for erythrocyte count and Hb and 0.67 for PCV and Hb. These results may be useful for physiological and behavioral research in camels. Reproduced with permission of CAB.

Descriptors: dromedary camels, basophils, coefficient of relationship, correlation, eosinophils, hematocrit, hematology, hemoglobin, leukocyte count, lymphocytes, monocytes, neutrophils, normal values, sex differences, cell count, eosinophil leukocytes, Abyssinia, Ethiopia.

Hadi, AAA; Wasfi, IA; Elghazali, M; Almahrami, AM; Barezaiq, IM; Alkatheeri, NA; Alhadrami, GA. **Comparison of the effect of *Sporobolus virginicus* and Rhodes (*Chloris gayana*) hay diets on the absorption pattern of phenylbutazone in the camel (*Camelus dromedarius*).** *Veterinary Journal.* 2005; 169(1): 91-96. ISSN: 1090-0233
NAL call no: SF601.V484
Abstract: The effect of feeding *Sporobolus* and Rhodes hay on phenylbutazone (4 g) relative absorption was examined in six camels using a two-period, two-sequence, two-treatment crossover design. Serum concentration of the drug was measured by high performance liquid chromatography. The measured values (means+or-SD) for Rhodes and Sporobolus hay, respectively, were C< sub>max</ sub> 35.59+or-22.36 and 36.55+or-18.99 micro g/mL, T< sub>max</ sub> 26+or-2.53 and 26.3+or-1.97 h and AUC< sub>0-72h</ sub> 1552+or-872.6 and 1621+or-903.6 micro g h/mL. Broad plateau concentrations of phenylbutazone in serum were observed between 12 and 36 h. There was no significant difference in any parameter between the two feeding regimens. Multiple peaks in serum concentration-time curve were observed, regardless of the type of grass available to and the animals prior to drug administration. It was concluded that the phasic absorption of phenylbutazone was a particular feature of hay feeding in camels, and the Sporobolus hay can be fed to camels without any effect on the rate and extent of phenylbutazone absorption compared to Rhodes grass hay. Reproduced with permission of CAB.
Descriptors: dromedary camels, analgesics, pain killers, phenylbutazone, absorption, blood chemistry, diet effects, *Chloris gayana*, *Sporobolus virginicus*, pharmacodynamics, drug action, pharmacokinetics, mechanism of drug action.

Johnson, LW. **Questions for the camelid consultant.** RA Smith (Editor). *Proceedings of the Thirty Eighth Annual Convention, American Association of Bovine Practitioners, Salt Lake City, Utah, USA, 24-24 September, 2005.* Published by the Association. 2005; 116-119
Descriptors: dromedary camels, animal health topics, reproduction, castration, diseases, survey camel care, camel health, castration, reproduction, surveys.

Kaufmann, BA. **Precision livestock farming in developing countries: creating order where uncertainty prevails.** In S. Cox (Editor). *Precision Livestock Farming-'-05*. Published by Waneningen Academic Publishers, Wageningen, NE. 2005; 327-335. ISBN: 907699868X. Note: ECPLF Proceedings. "2nd European Conference on Precision Livestock Farming."
Abstract: The aim of this study was to devise a systematic approach to describe and analyse the management of livestock keepers in resource poor systems. Camel keepers controlling the reproduction of their camels was used as an example. The control loop was used as an analytical tool. This study was carried out in the dry lands of Northern Kenya, where livestock husbandry was the only means of livelihood. Data were collected by conducting a series of open interviews with key informants (camel herd owners). The analysis was directed towards the identification of traits which livestock keepers considered for their management, determination of the trait expressions that were differentiated and led to an action, and identification of the rules behind the actions. Livestock keepers attempted to control the conception in primiparous and multiparous camels. The control influenced the number of offspring and milk offtake from the herds. When controlling the conception in female camels, the livestock keepers observed the following traits: age of the camel; period since last parturition; sexual

behaviour; occurrence of mating and conception; pregnancy behaviour; health status; body condition; conception problems; infertility; and fate of calf. Observation of environmental disturbance factors was mostly done using the affected traits of the animals. For each of the different trait expressions observed, there were rules on how the livestock keeper reacted to the disturbance. The main characteristic of the present analysis was that the researcher assessed how the livestock keepers created order for their managerial purposes instead of collecting data on elements of the production system, analysing them to create order for scientific or extension purposes and coming up with a hypotheses. Reproduced with permission of CAB.

Descriptors: dromedary camels, livestock farming, reproduction management, farmers,age, sexual practices, behavior, body condition; conception, conception rate, analytical techniques, environmental factors, farm management, infertility, mating frequency, parturition, pregnancy, reproductive behavior; reproductive disorders, sexual behavior, developing countries, underdeveloped countries, Kenya.

Kaufmann, BA. **Reproductive performance of camels (*Camelus dromedarius*) under pastoral management and its influence on herd development.** *Livestock Production Science*. 2005 Jan; 92(1): 17-29. ISSN: 0301-6226

Abstract: Camels (*Camelus dromedarius)* produce milk and offspring and provide transport in pastoral husbandry systems in the Afro-Asian dryland belt. The aim of the present study was to investigate the reproductive performance of camels kept under pastoral management in northern Kenya. Using the Progeny History surveying technique, data were collected from 471, 287 and 416 adult Rendille, Gabra and Somali female camels including data on 1506, 789 and 1206 parturitions, respectively. Surveys took place from January to December 1995, but data refer to the 15-year production period preceding the survey. Age at first calving (AFC) was 58.4+/-1.0 months (LSMeans+/-S.E.), 63.0+/-1.1 months and 68.4+/-1.3 months for the Somali, Rendille and Gabra camels, respectively. The mean calving interval was similar for all three populations with 27.3+/-0.6 months (LSMeans+/-S.E.) for Rendille camels, 28.0+/-0.6 months for Gabra (n=500) and 28.4+/-0.6 months for Somali camels. The annual calving rate varied between 33% and 46% in the Somali, 19% and 44% in the Gabra and 8% and 86% in the Rendille camel population. Calf mortality rate averaged 25%, 22% and 27% in Rendille, Gabra and Somali camel calves, respectively, and showed highest variation between the years in the Rendille system (5% to 60%). The number of adult breeding females increased by about 20% over a simulation period of 10 years using the status quo reproductive parameters and by about 70% with improved AFC and CI (excluding AFC>78 months and CI>36 months). The results reveal the usual and unusual variation in the reproductive parameters over different years and in the different systems. It is concluded that eliminating unusual variation is a promising way to enhance herd development and reduce risk in the production systems.

Descriptors: camel breeds, dromedary camels, females, reproductive efficiency, livestock production, arid lands, calving rate, calving, calving interval, animal age, neonatal mortality, Kenya.

Khanchaev, H. **Pasture ration of Arvana camels in desert pastures.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 209-210. ISBN: 1586034731
Abstract: The natural conditions of Turkmenistan caused camel breeding to be one of the inherent branches in desert stock raising. Camel breeding gives an opportunity to considerably improve the use of the desert pastures on draught territories covered with the rarefied wormwood-halophytic plants. The pasture ration of Arvana camels during maintenance on the sandy Karakum pastures mainly consists of the vegetation and dry twigs of the bushes *Haloxylon persicum,Calligonum* sp. *Salsola richteri*, *Ephedra strobilacea* and partly spring and spring-summer grasses. On the pastures of gypsum and clay desert, the basic fodder for the camels are different forms of the wormwood *Artemisia* sp. and annual saltwort from the kinds of *Climacoptera*, *Salsola* and *Gamantus* etc. In the article, seasonal changes in the pasture ration of the camels during the maintenance on the desert pastures are described. Reproduced with Permission of CAB.
Descriptors: dromedary camels, arid lands, deserts, fodder, pasture plants, seasonal variations, *Artemisia*, *Calligonum*, *Ephedra*, *Haloxylon persicum*, *Salsol*, *Salsola richteri*, Turkmenistan, Central Asia.

Khorchani, T; Hammadi, M; Moslah, M. **Artificial nursing of camel calves: an effective technique for calves safeguard and improving herd productivity.** In: B. Faye and P. Esenov. (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 168-172. ISBN: 1586034731
Abstract: In Tunisia, camel (*Camelus dromedarius*) is raised in an extensive system. This species was embossed in arid and desert areas where other domestic species cannot subsist and where nutrition is based mostly on the natural range vegetation which is affected by rainfall. Although camel is the best animal for these harsh conditions, the productive and reproductive performances of this species are strongly related to range productivity. Milk production is very limited during dry seasons and cannot provide the requirements of calves. In an extensive breeding system, dams calve every 24 months and rate of calf loss by predation or by milk shortage varies from 8 to 25%. During dry year, artificial nursing technique safeguards calves and ensures comparable mean daily gain compared to those of suckling calves (593 g and 607 g, respectively). In normal conditions, calves can be separated from dams at 3 to 7 days of age to receive reconstituted milk. This early separation allows the insemination of 97.7% of dams after 3 to 4 weeks postpartum. Consequently, the interval between calving is reduced to 14 months. These results demonstrate the important possibilities to improve camel productivity. Higher camel production constitute the better mean to incite young breeders who are more anxious to the profitability of their activities. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel production, intensive camel raising, estrus, calving rate, calving interval, conception rates, calves, hand rearing of calves, artificial rearing, camel milk, growth rate, liveweight gain, camel milk production, milk substitutes, reproductive performance, reproductive traits, seasonality, Tunisia.

Kohler Rollefson, I; Rathore, HS. **Participatory approaches to using the camel in combating desertification.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 35-42. ISBN: 1586034731

Descriptors: dromedary camels, herd size, combating desertification, camel numbers, use of camels, abortion, animal breeding, mange, *Trypanosoma,* trypanosomiasis, bone fractures, bone-meal, camel-based products, camel meat, camel milk, leather, wool, hides, working camels, draft camels, feces, income, profits, socioeconomics, transport, trends, Rajasthan, India.

Konuspayeva, G; Serikbayeva, A; Loiseau, G; Narmuratova, M; Faye, B. **Lactoferrin of camel milk of Kazakhstan.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 158-167. ISBN: 1586034731

Abstract: Lactoferrin is an iron-containing protein with a molecular mass of 76-80 kDa with 689 amino acids residues and 2 Fe3+ binding centres. This relatively recently known protein has a number of properties. It has antibacterial, antiviral, antifungal, anticarcinogenic, antiinflammatory, antioxidant and analgesic properties. Lactoferrin raises the immune response of the organism and is involved in Parkinson's and Alzheimer's diseases. Lactoferrin is present in all excretory secretions of mammals such as tears, saliva, blood, urea, nasal and uterus cavity, sperm and amniotic and also in the neutrophil of leukocytes. Mostly, lactoferrin is present in milk and colostrum. A comparative survey of lactoferrin concentration in different milks showed that the biggest content is in camel milk. Camel milk has 30-100 times higher concentration of lactoferrin than bovine milk. After heat treatment at 85 degrees C, camel milk still contains 37% of lactoferrin, whereas bovine milk only contains 1.2%. Bovine and camel lactoferrin are homologous in affinity, being 74.9%. Amino acid compound studies showed that camel lactoferrin is rich with Met, whereas bovine lactoferrin is rich with Val. Camel milk is a traditional food product in Kazakhstan and accounted to be a health-promoting product that helps in healing and preventing many diseases. However, these properties of camel milk are still unproven by scientists. It is believed that lactoferrin is remarkably responsible for such properties of camel milk. Lactoferrin is also used as a preserving agent in food, medicines and cosmetics. Technologies of industrial purification are now developing. The number of use targets is rapidly growing. For example, lactoferrin can be used in diagnostics of inflammation processes. Reproduction with permission of CAB.

Descriptors: dromedary camels, camel milk, milk composition, antibacterial properties, anticarcinogenic properties, antifungal properties, anti-inflammatory agents, antiviral properties, immunity, iron binding capacity, lactoferrin, analgesics, Kazakhstan.

Kraft, Uwe; Kraft, Frank. **Free-Rein Walking Machine for training animals along a defined training course.** *Official Gazette of the United States Patent and Trademark Office Patents.* 2005. ISSN: 0098-1133

Abstract: The present invention discloses a Free-Rein Walking Machine for the purpose of training animals along a defined training course, especially for the training of horses and camels. The Free-Rein Walking Machine has a number of Moving-Guide-Components that are moveably arranged along a support structure. The path of movement of the Moving-

Guide-Components defines or corresponds to the training course for the animals. The supporting structure has at least one fixed rail, on which at least one traveler is moveably arranged. The Moving Guide Components are connected to the at least one traveler.
Descriptors: camels, horses, Free Rein Walking Machine, invention, animal training machine, equipment device.

Kuria, SG; Wanyoike, MM; Gachuiri, CK; Wahome, RG. **Nutritive value of important range forage species for camels in Marsabit District, Kenya.** *Tropical and Subtropical Agroecosystems.* 2005; 5(1): 14-24. Note: In English with a Spanish summary.
URL: http://www.veterinaria.uady.mx/publicaciones/journal/camel48.pdf
Descriptors: dromedary camels, range forage plant species, herbage, rangelands, seasonal changes, shrubs, woody plants,grasses, nutritive value, ash, chemical composition, crude protein, dry matter, fiber, Poaceae, *Duosperma eremophilum*; *Indigofera spinosa*, neutral detergent fiber, nutritional value, Kenya.

Mari, FM; Soomro, FM; Tehmina Mangan. **Economics of livestock farming by pastorals in Nara Desert of Sindh, Pakistan.** *Indus Journal of Biological Sciences.* 2005; 2(1(Suppl.)): 131-136. ISSN: 1811-1505
Abstract: People in the Nara Desert (Sindh, Pakistan) largely depend on livestock farming and wage earnings in the adjacent irrigated farming zones. Pastoralists shift to the wandhs (protected areas of grazing) from December to February. After these months, pastoralists start to migrate to the irrigated areas near Nara canal, depending on the drought level and scale. Cattle, goat and camel are the common types of livestock in the area. Livestock products such as milk, butter fat and yoghurt are common items in daily diet of the people. The livestock owned by 54 respondents are comprised mainly of goats (55%), whereas sheep and cattle each comprise 18%. Camels constitute 9% of the livestock population in the area. Economic analysis of livestock herds indicate that the pastoralists/herders receive an amount of Rs. 683.15, 741.56, 1900.00 and 600.00 per head of goat, sheep, cow and camel, respectively.
Descriptors: camels, goats, sheep, cattle,animal production, livestock numbers, production economics, costs, returns, livestock farming, pastoralism, returns, transhumance, Sindh, Pakistan.

Matofari, JW; Younan, M; Nanua, JN; Mwatha, EW; Okemo, PO. **Microorganisms associated with sub-clinical mastitis and their impact on milk production in camels (*Camelus dromedarius*) in semi-arid lands of Northern Kenya.** *International Journal of Agriculture and Rural Development.* 2005; 6: 182-187. ISSN: 1595-9716
URL: http://www.ajol.info/viewarticle.php?jid=12&id=24361&layout=abstract
Abstract: Camels are adapted to the arid and semi arid lands (ASAL), but their full milking potential is affected by udder infection especially sub-clinical mastitis. The purpose of this study was to identify the most common pathogens responsible for sub-clinical mastitis in camels kept under ranch conditions in Northern Kenya. A total of 435 camel milk samples were collected over a period of 11 months and examined for mastitis causing microorganisms. Mastitis causing bacteria were isolated from 66.7% of the samples. The most prevalent groups were group D streptococci (30%), coagulase negative *Staphylococcus* (CNS) (20.1%),

Staphylococcus aureus (16%), *Streptococcus dysgalactiae* (3.6%) and *Streptococcus agalactiae* (1.5%). Other isolates were Coliforms and Micrococci. *Streptococcus dysgalactiae* and *Streptococcus agalactiae* had a greater association with sub-clinical mastitis than the other pathogens. *Streptococcus agalactiae* and *Staphylococcus aureus* were ranked as infectious pathogens while group D streptococci, *Streptococcus dysgalactiae,* CNS, Coliforms and Micrococci were ranked as environmental pathogens. The mean milk yield from quarters infected with infectious streptococcal pathogens was 1.58 L per milking, which was lower than that from quarters infected with environmental streptococci (2.63 L). Sub-clinical mastitis in camels has adverse implications and needs to be addressed in order to maximize camel production in the ASAL.
Descriptors: dromedary camels, camel milk yield, subclinical mastitis, udder quarters, coliform bacteria, coagulase negative staphylococci, *Staphylococcus aureus,Streptococcus agalactiae*, *Streptococcus dysgalactiae*, semiarid climate, Kenya.

Mikova, K; Sovjak, R. **A review: possibilities of allosuckling occurrence in camels (*Camelus bactrianus*).** *Agricultura Tropica et Subtropica* 2005; 38(3/4): 91-93. ISSN: 0231-5742
URL: http://www.itsz.czu.cz
Abstract: Allosuckling (non-offspring nursing) occurs in many mammalian species. This paper discusses five main hypotheses of allonursing (kin selection hypothesis, reciprocity hypothesis, parenting hypotheses, milk evacuation hypothesis and misdirected parental care hypothesis) and the reasons of allosuckling in animals. Allosuckling is usually observed in ungulates like pigs and ruminants (fallow deer, red deer, water buffalo and others) and its occurrence is increased by captivity. However, allosuckling is also observed in wild animals. Cases of allosuckling are witnessed in camels but no study is yet conducted regarding this behaviour. Future studies of the allosuckling behaviour in camels are proposed in this review.
Descriptors: dromedary camels, pigs, swine, wild animals, ruminants, lactating females, allosucking behavior, non-offspring nursing, maternal behavior, reviews.

Moges Dereje; Uden, P. **The browsing dromedary camel. I. Behaviour, plant preference and quality of forage selected.** *Animal Feed Science and Technology.* 2005; 121(3/4): 297-308. ISSN: 0377-8401
Abstract: A study was conducted in the Erer valley, Eastern Ethiopia to determine the behaviour, dietary preference and forage quality of free ranging dromedary camels. Each day for 24 days each in the dry and wet seasons, one camel was randomly selected from one of four age and sex categories (adult males (AM), young males (YM), young females (YF) and adult females (AF)), to measure time spent on various activities. The observation period was between the time of turning out for browsing and coming back to corrals at dusk. Browsing/grazing was the dominant daytime activity occupying between 0.63 and 0.68 of the time in both seasons, followed by walking, resting other activities and ruminating. Young camels spent more ($P<0.01$) time browsing than adults. The adult camels spent more ($P<0.05$) time resting and on other activities, as compared to the young camels in the wet season. Variation between seasons was also high and more ($P<0.001$) time was devoted to browsing in the dry season. In contrast, walking, ruminating and other activities were higher ($P<0.001$) in the wet season. Browsing preference, observations were made on 240 camels to measure time spent feeding on different plants. Each camel was followed for a maximum of 3 min in both the dry and the wet season. The camels selected a total of 21 species of plants in the

dry and 30 in the wet season. On average, 0.79 and 0.83 of the camels' diet was comprised of perennial woody plants in the dry and wet season, respectively and the 10 most preferred plant species occupied 0.87 and 0.80 of the total feeding time in the dry and the wet season, respectively. The highest ranked plant was *Opuntia* (0.18) in the dry season and *Acacia brevispica* (0.22) in the wet season. The range in composition of the ten most preferred species (g/kg dry matter (DM)) were for crude protein (CP) 88-228, P 1.3-3.3, Ca 12-48, soluble tannins 29-216 and condensed tannins 9.4-129 abs. unit/g. In vitro dry matter digestibility (IVDMD) varied between 0.41 and 0.65.

Descriptors: dromedary camels, feeding behavior, browsing, dry matter, feeding-preferences; forage, grazing, in vitro digestibility testing, seasonal variation, *Acacia brevispica*, behavior, browsing behavior, browsing behavior, digestibility in vitro, feed preferences, feeding behavior, pasturing, seasonal changes, seasonal fluctuations, Abyssinia, Ethiopia.

Moges Dereje; Uden, P. **The browsing dromedary camel. II. Effect of protein and energy supplementation on milk yield.** *Animal Feed Science and Technology.* 2005; 121(3/4): 309-317. ISSN: 0377-8401

Abstract: An on-farm experiment was conducted in Erer Valley of Eastern Ethiopia to study the effects on milk yield in lactating dromedary camels, of supplementing with a protein or energy concentrates. The treatments were control: browsing only; energy supplement (ES): browsing+ground maize (*Zea mays*) and protein supplement (PS): browsing+decorticated groundnut (*Arachis hypogaea* L.) cake. The experiment was replicated both in the dry and wet seasons. Six dromedary camels with estimated live weights of 453-473 kg were allocated randomly at peak lactation to one of three treatments in a double 3x3 Latin Square design. All camels were grazed during daytime hours, and camels receiving supplements were fed 4 kg of either supplement, divided in two equal morning and evening meals for a period of 63 days in both the dry and wet seasons. Milk yield differences between all treatments were significant ($P< 0.001$) with PS > ES > control, being 12.9, 9.1 and 7.6 kg for PS, ES and control, respectively. There were also differences ($P< 0.05$) between the treatments with regard to fat, with PS > control and ES, showing levels of 39, 37 and 37 g/l, respectively. Within-season variation in milk yields was similar among dietary treatments, and also highly significant ($P<0.001$). Milk yield and fat differences between seasons were also significant, with 9.2 and 10.4 kg milk ($P<0.001$) and 37 and 38 g/l fat ($P<0.05$), were recorded for the dry season and wet season, respectively. There were no differences between treatments and seasons with regard to milk protein contents. Results show that oil seed by-products with relatively high crude protein value, such as groundnut cake, have a substantial effect on milk production in camels. This finding is of particular importance for regions where traditional range feed resources are becoming scarce. Reproduced with permission of CAB.

Descriptors: dromedary camels, browsing behavior, browsing choices, feed resources, seasonal variations, energy levels from browsing, milk yields, milk composition, milk fat, butter fat, milk protein, protein supplements, Ethiopia, Abyssinia.

Mohamed, HE; Mousa, HM; Beynen, AC. **Ascorbic acid concentrations in milk from Sudanese camels.** *Journal of Animal Physiology and Animal Nutrition*. 2005; 89(1/2): 35-37. ISSN: 0931-2439

Abstract: The present study in Sudanese camels was done to describe the associations

between vitamin C concentrations in milk, and either breed, stage of lactation, parity or the presence of mastitis. A total of 2586 camels were sampled. Arabi camels had higher ascorbic acid levels in milk than did either Anafi or Bishari camels. Milk ascorbic acid levels were higher for camels more than 180 days in lactation than for those earlier in lactation. Multiparous vs. primiparous camels had higher ascorbic acid concentrations in their milk. The ascorbic acid content of colostrum was higher than that of milk. Mastitis was associated with a decrease in the ascorbic acid content of both milk and blood plasma.
Descriptors: dromedary camels, lactation stage, camel milk, colostrum, ascorbic acid, vitamin C levels, breed differences, mastitis, Sudan, East Africa.

Mohammed Bengoumi; Faulconnier, Y; Ahmed Tabarani; Abdelmalek Sghiri; Faye, B; Chilliard, Y. **Effects of feeding level on body weight, hump size, lipid content and adipocyte volume in the dromedary camel.** *Animal Research*. 2005; 54(5): 383-393. ISSN: 1627-3583. Note: In English with a French summary.
URL: http://www.edpsciences.org/animres/
Abstract: In order to study the effect of underfeeding and overfeeding on the fat deposition in the dromedary camel, 14 camels were divided into three groups: an overfed-underfed group (OV-UN), an underfed-overfed group (UN-OV) and a control group (CTRL). After a 4-wk adaptation, a cross-over design was applied for 16 weeks including two periods of 8 weeks each. The three energy levels in the diet corresponded to 17% (UN), 68% (CTRL) and 134% (OV) of the theoretical maintenance energy requirements. Body weight and barymetric parameters were measured weekly. Hump fat samples were collected monthly for determination of adipocyte size and lipid content. Overfeeding had or tended to have a significant effect on body weight, hump size, hump lipid content and adipocyte volume. Thus, the increase of the hump weight was 71% in the OV-UN group and 19% in the UN-OV group. Hump fat content increased from 52.9 to 63.6% in the OV-UN group and from 54.2 to 64.7% in the UN-OV group. Similarly, trends were observed for the adipocyte volume with an increase from 138 to 253 pL and from 275 to 346 pL in the OV-UN and UN-OV groups, respectively. Underfeeding had reverse effects: the hump weight decreased by 41% in the OV-UN group and 4% in the UN-OV group. Similarly, the hump lipid content decreased significantly in the OV-UN group from 63.6 to 53.0% and not significantly from 58.0 to 54.2% in the UN-OV group. Underfeeding decreased the adipocyte volume from 253 to 167 pL (OV-UN group) and from 292 to 275 pL (UN-OV group). A high significant positive correlation was observed between the hump lipid content and adipocyte volume. Low speed changes in the hump size, volume and lipid content could be linked to the camel adaptation to underfeeding conditions in dry areas.
Descriptors: dromedary camels, adipocytes, body measurements, body weight, energy intake, lipids, overfeeding, underfeeding, fat cells, lipins, overnutrition.

Nagpal, AK; Manju Arora; Singh, GP. **Nutrient utilization of gram straw (*Cicer arietinum*) based complete feed blocks in camel calves.** *Indian Journal of Animal Sciences.* 2005; 75(1): 64-68. ISSN: 0367-8318
Abstract: In the first phase of this study, the nutritional value of gram straw (GS) as the sole roughage diet in 4 camel calves (10-12 months of age, 241-276 kg body weight) was studied for 21 days. In the second phase, 12 camel calves (approximately 10 months of age,

187-240 kg body weight) were randomly distributed into 3 groups of 4 each and were given a complete ration in loose form (CR1-L) consisting of gram straw, chaffed dry groundnut forage and concentrate at a ratio of 70:15:15; complete ration having similar composition as that of CR1-L but in the form of feed blocks (CR1-FB) and complete ration consisting of gram straw, groundnut forage and concentrate in the ratio of 60:25:15 in feed block form (CR2-FB) for 98 days. It was shown that there were significant (P<0.05) differences for all proximate principles except crude fibre (CF) and cell wall components among GS and CR1-L, CR1-FB and CR2-FB. Intakes of digestible crude protein (DCP), total digestible nutrients (TDN) and metabolizable energy (ME) did not differ significantly among CR1-L, CR1-FB and CR2-FB but were significantly higher than GS. Nutrient intake in terms of DCP g/kg W0.75 was significantly highest (7.77) in CR2-FB and lowest (4.01) in GS, while TDN was significantly highest (62.40) in CR1-L and lowest in GS (41.41). The apparent absorptions (%) of Na, Ca and P differed non-significantly among the groups given complete rations but were significantly higher compared to GS. The average daily liveweight gain and feed/body weight gain ratio did not differ significantly among CR1-L, CR1-FB and CR2-FB and ranged from 377.55-420.92 g/day and 13.51-14.30, respectively. In conclusion, camel calves given complete feed blocks have better nutrient utilization and growth, apart from the additional advantages of easy handling, storage and transport of complete feed blocks.
Descriptors: dromedary camel calves, liveweight gain camel feeding, feed rations, feed intake, *Cicer arietinum*, chickpeas, absorption, cell wall components, chemical composition, crude fibre, crude protein, diets, feed conversion efficiency, metabolizable energy, nutrition physiology, nutritive value, calcium, phosphorus, sodium.

Nagy, P; Juhasz, J; Wernery, U. **Incidence of spontaneous ovulation and development of the corpus luteum in non-mated dromedary camels (*Camelus dromedarius*).** *Theriogenology*. 2005 July 15; 64(2): 292-304. ISSN: 0093-691X
URL: http://www.theriojournal.com/home
NAL Call No.: QP252.A1T5
Abstract: The occurrence of spontaneous ovulation in dromedaries was examined in two separate studies including 20 non-lactating, barren and 12 lactating dromedaries, respectively. Lactating camels were milked twice a day with an automatic bucket milking machine. Ovarian activity was monitored by repeated ultrasonography. Blood samples for progesterone were collected daily or two to three times a week. To compare CL development after spontaneous and induced ovulations, ovulation was induced by a GnRH analogue in eight lactating dromedaries. Spontaneous ovulation was observed in one non-lactating camel (1 of 20 camels, 5%; 1 of 70 follicular waves, 1.4%), whereas, spontaneous ovulation was detected more frequently in lactating dromedaries (5 of 12 camels, 41.7%; 13 of 91 follicular waves, 14.3%). In one lactating camel, spontaneous ovulation occurred repeatedly for nine times. There was a significant effect of type of ovulation (spontaneous versus induced, $P < 0.05$) and day ($P < 0.001$) on serum progesterone concentration. Mean serum progesterone levels and total progesterone production (AUC) were higher after induced ovulation. Luteal diameter and serum progesterone concentration were positively correlated ($r = 0.71$, $P < 0.001$), but there was a significant difference between morphological and functional development of the CL. In dromedaries, morphological development starts earlier, morphological regression starts later and last longer than functional development and regression of the CL. Compared

to induced ovulation, functional development of the CL after spontaneous ovulation might be altered but the morphological development is not affected.
Descriptors: dromedaries, lactating and non-lactating females, lactation, follicular development, spontaneous ovulation, ultrasonography monitoring, United Arab Emirates.

Nolte, M; Kotze, A; Bank, FH van der; Grobler, JP. **Microsatellite markers reveal low genetic differentiation among southern African Camelus dromedarius populations.** *South African Journal of Animal Science.* 2005; 35(3): 152-161. ISSN: 0375-1589
Abstract: We report new demographic and genetic data on southern African camel (*Camelus dromedarius*) populations. Results from questionnaires on demography indicated that approximately 476 camels were extant in South Africa, Namibia and Botswana in 2003. We have sampled 234 camels for genetic analysis using a microsatellite marker set consisting of 12 loci. Results indicated little differentiation between camels from southern Africa, the Sudan or an outgroup from the family Camelidae, the alpaca (*Lama pacos*). Analysis of molecular variance (AMOVA) showed that -0.09% of total variation reside between species, 0.26% between the two southern African camel populations and 99.83% within populations. A coefficient of population differentiation (R< sub>ST</ sub>) indicated low levels of differentiation between southern African camel populations, with no specific pattern observed in pair-wise comparisons of 16 populations. An assignment test conformed to known population histories and provided additional support for the hypothesis of low differentiation between populations. There was no evidence of loss of genetic diversity in any individual population. Parentage analysis confirmed the utility of the microsatellite marker set for elucidating uncertain paternity. The results are discussed with reference to the management history of camels in the southern African region and the importance of population and parentage verification in the light of the many historic translocations. Reproduced with permission of CAB.
Descriptors: dromedary camels, genetic markers, genetic variation, geographical distribution, loci, microsatellites, populations, genetic variability, genotypic variability, genotypic variation, minisatellites, South West Africa, Botswana, Namibia, South Africa.

Owen, E; Kitalyi, A; Jayasuriya, N; Smith, T (Editors). ***Livestock and Wealth Creation: improving the Husbandry of Animals Kept by Resource-Poor People in Developing Countries.*** Nottingham University Press, Nottingham, 2005; xii + 601 pp. ISBN: 1904761321
Abstract: This book is about the role of livestock in developing countries and how improved husbandry practices can benefit livestock keepers, with emphasis on ways of improving small-scale enterprises and subsistence livestock keeping. The first part of the book presents key issues and principles in livestock development and poverty alleviation, and on issues which need to be understood before embarking on improving output from a given species. The 13 chapters in this part include topics on livestock systems, poverty assessment methods, livestock development and poverty, knowledge for empowerment, livestock products and improvement, marketing to promote development, livestock and the environment, animal responses to nutrient supply, feeds and feeding to improve productivity, sustainable breeding strategies and improving livestock health. The second part considers individual species, with emphasis on how to improve productivity to achieve sustainable livelihoods for livestock keepers. The chapters in this part discuss apiculture, giant African snails, poultry, guineapigs

and rabbits, pigs, goats, sheep, African camels and South American camelids, cattle, buffaloes, yaks, equines and wildlife. Most of the chapters are preceded by information on how livelihoods were improved by adopting given improvements in animal husbandry. The last chapter considers the lessons learned in animal production and future progress. This book is intended for smallholder livestock keepers in all developing countries. Reproduced with permission of CAB.
Descriptors: dromedary camels, buffaloes, cattle, goats, guineapigs, swine, pigs, rabbits, sheep, snails, yaks, apiculture, domesticated birds, honeybees, horses, snails, wild animals, agricultural development, animal breeding, animal feeding, animal health, animal husbandry, animal production, animal products, beekeeping, domestic animals, feeds, livestock-farming, marketing, poultry, poverty, sustainability, Third World, Underdeveloped Countries.

Rajesh Garg; Gahlot, AK; Tanwar, RK. **Vitreous potassium change in animals in relation to time since death.** *Indian Journal of Animal Sciences.* 2005; 75(11): 1286-1287. ISSN: 0367-8318
Descriptors: dromedary camels, goats, cattle, aqueous humour, changes proceeding after death, equations, vitreous potassium.

Rajput, DS; Tripathi, H. **Migratory pattern of Raika pastoralists in Bikaner district of Rajasthan.** *Journal of Camel Practice and Research.* 2005; 12(1): 53-56. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Based on data from 60 camel-owning families, this paper provides an overview of the migration system of the Raika pastoralists in Bikaner district, Rajasthan, India. The Raika of this region fall into the category of semi-nomadic pastoralists because they adopt migration during droughts, which frequently occur in this region and cause heavy economic and biological losses to camel farmers. The Raika pastoralists follow no particular route and area for migration. The route is selected after thorough discussion with family members and other pastoralists in the village and according to the probability of getting good pasture and more water for animals. They face many problems during migration but they perceive it as essential for saving their camels and other livestock from adverse situations. Reproduced with permission of CAB.
Descriptors: dromedary camels, drought, nomadism coping strategies, migration decisions, Raika pastoral society pastoralism, transhumance, Rajasthan, India.

Rajput, DS; Hema-Tripathi. **Camel husbandry practices followed by Raika pastoralists under semi-intensive system in Bikaner district of Rajasthan.** *Indian Journal of Animal Sciences.* 2005; 75(11): 1307-1313. ISSN: 0367-8318
Abstract: Camel husbandry practices among 60 selected Raika pastoral families in 4 villages of Bikaner district of Rajasthan were studied. Most of the Raikas were utilizing traditional tools and techniques in camel management and keeps their camels in semi-intensive system. Their camel management practices were unique under severe drought and harsh climatic conditions. Feeding system comprised locally grown leguminous fodder crops (moth chara, muffali chara and guar phalgati) as common roughages, while concentrates and salt were offered in low quantities than the scientific recommendations. Raika pastoralists were well versed with camel breeding practices and preferred natural service for breeding over the artificial insemination. Camels in the region are kept in the open areas irrespective of the season,

however, they were protected in the extreme winter. They preferred the traditional system of treatment for camel health care over the veterinary doctors. Camel husbandry was an important source of income among all families. Marketing of camel was the major trade to earn/generate money among pastoralists. Generally adult male camels were sold after the age of 5 years. Raikas never sell either the camel milk or products. It was mostly consumed at home as such or after preparing kheer, otherwise it was supplied to the neighbours or hospitals for patients at free of cost. Reproduced with permission of CAB.
Descriptors: camels, animal breeding, animal health, animal husbandry, feeding, Raika pastoral society, indigenous knowledge, marketing, pastoralism, traditional technology, Rajasthan, India.

Rashed, MN; Soltan, ME. **Animal hair as biological indicator for heavy metal pollution in urban and rural areas.** *Environmental Monitoring and Assessment.* 2005; 110(1/3): 41-53. ISSN: 0167-6369
URL: http://springerlink.metapress.com/link.asp?id=102878
Abstract: Animal hair is a good biomonitoring tool for heavy metals assessment and reflects the content of heavy metals in the forage and soil. Heavy metals Fe, Mn, Co and Ni as well as toxic metals Cd and Pb were determined in goat, sheep and camel hair, forage and soil collected from four different environmental urban and rural regions. These regions are Aswan city farms, Allaqi desert pasture, Kalabsha farms and Halaiub desert pasture at far south of Egypt. The results reveal that sheep hair contains the highest levels of Fe and Mn (879 and 55 micro g/g, respectively), camel hair contains the highest Pb, whereas for goat Cd and Ni were the highest. Heavy metal concentrations in the studied hair reflect the presence of these metals in the surrounding forage and soil and vary from one area to another, and give knowledge of pollution in the area. Correlation statistics analysis and cluster analysis show a good and significant value between metals in hair and plants. Reproduced with permission of CAB.
Descriptors: camels, goats, sheep, hair sampling, biological indicators of pollution, chemical analysis, cluster analysis, contaminants, correlation analysis, environmental assessment, farms, fodder plants, forage, heavy metals contaminatns, cadmium, cobalt, iron, lead, manganese, nickel, plant composition; pollution, soil composition; soil pollution, soil types, urban areas, rural areas, chemical constituents of plants, environmental pollution, grassland soils, grazing lands, pasture soils, pasture plants, straw, *Tephrosia purpurea*, *Tamaricales*, *Tamarix nilotica,Astragalus vogelii clovers, Hordeum vulgare*, barley straw, *Aristida funiculate*, *Zygophyllum*, *Tamarix,Astragalus*, Egypt.

Rizwana, H; Son, JK; Qaimkhani, MA; Baloch, MH; Mughal, GA. **Management and production pattern of Dhatti breed of camel in desert area.** *Proceedings of Pakistan Congress of-Zoology.* 2005; 25: 137-147. ISSN: 1013-3461. Note: "Proceedings of the 25th Pakistan Congress of Zoology, Tandojam, Pakistan, 1-3 March, 2005.
Abstract: An investigation was undertaken by interviewing 22 camel farmers randomly selected from each taluka of the district Thar, in order to assess management and production patterns of Dhatti breed of camel in desert area of district Thar. Study revealed that literacy rate was extremely low, only 14.77% of the farmers were literate up to primary level while 85.23% were illiterate. Similarly 45.45% farmers were landless, 44.32% possessed less than 2

acres of land and 10.23% possessed 5 acres of land. The herd size possessed below 30, 30-40, 40-50 and above 50 camels by 44.30%, 32.95%, 17.04% and 7.57% farmers, respectively. The sex ratio 62.20% female and 37.80% male. The farmers preference of camel over other modes of transportation were; 61.37% farmers preferred camels and 18.18% preferred lorries 6.81% preferred tractors, 5.68% preferred jeeps and 7.95% farmers preferred buses. The average birth weight in male was 55.19 kgs and in female 51.63 kgs. The weaning age, age at puberty, age at first service, gestation period and calving interval averaged 281.25, 1151, 14223.75, 393.25 and 724.5 days, respectively. The conception rate was 66.75% and time taken in parturition was 51.13 minutes. The daily milk averaged 7.03 litre and 1743 litres milk per lactation while the average lactation length was 340 days. The average dry period was 358.75 days. The mean age at first riding in male was 1272 days and in female 1073.25 days, age at first loading in male was 1277 days and in female 1081.25 days, speed without load was 7.89 km/hr speed with load was 6.88 km/hr, load carried 300.46 kg, depth of well averaged 157.5 feet, quantity of water drawn from well 2040 litres per day. Quantity of water supplied on the back of camel was 195.75 litres per trip and land ploughed 3.89 acres per day. The camel were shorn once a year during the months of March and April. Hair production averaged 1.05 kg in female and 1.25 kg in male per animal annually. The camel hair is used for making rope and Farasi (Kharar) the price per camel averaged Rs.21,375. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel production, conception rates, birth weight, calving interval, camel milk, weaning weight, farm management, farmers, farmers' attitudes, milk yield, pregnancy, ropes, arid lands, deserts, Pakistan.

Saidabadi, Mohammad Sadegh. **Clinical pregnancy diagnosis in dromedary camel**. *Biology of Reproduction.* 2004; (Sp. Iss. SI): 118. ISSN: 0006-3363. Note: "37th Annual Meeting of the Society for the Study of Reproduction, Vancouver, Canada; August 01-04, 2004."
URL: http://www.biolreprod.org/
Descriptors: dromedary camels, females, pregnancy status, pregnancy, clinical diagnosis, diagnostic techniques.

Singhal, K; Madhu ohini; Jha, K; Gupta, PK. **Methane emission estimates from enteric fermentation in Indian livestock: dry matter intake approach.** *Current Science.* 2005; 88(1): 119-127. ISSN: 0011-3891
URL: http://www.ias.ac.in/currsci/welcome.htm
Abstract: Methane emission from enteric fermentation of Indian livestock was estimated using the dry matter intake approach. Indian livestock emitted about 10.08 Tg methane due to enteric fermentation in the year 1994, in which crossbred cattle, indigenous cattle, buffaloes, goats and sheep and other livestock (mule, yak, camel, donkey, pig, mithun, horse and pony) emitted about 4.6, 48.5, 39, 4.7, 1.8 and 1.4%, respectively. Amongst states, methane emission was highest in Uttar Pradesh followed by Madhya Pradesh and Bihar due to their larger livestock population. Average methane emission for lactating animals was about 53.6 g CH< sub>4</ sub>/kg milk; however, when the methane emission from whole livestock population (productive and non-productive male and female) was considered, the emission value was about 159.9 g CH< sub>4</ sub>/kg milk. Studies for reducing uncertainty in methane emission estimate and mitigating the same from the livestock may be undertaken as

it is a major sources category in the agriculture sector.
Descriptors: livestock, methane emission, enteric fermentation, feed intake, livestock, India.

Sopyev, B; Saparov, G; Annamukhammedov, O. **Camels of the Arvana breed: history, modern state and perspectives for the development.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 18-22. ISBN: 1586034731
Descriptors: dromedary camels, Arvana breed, weaning young animals, camel breeding, selective breeding, camel meat production, camel milk, camel milk composition, camel milk production, camel milk products; dairy products, wool, Turkmenistan, Central Asia.

Tasov, A; Alybaev, N. **Camel genetic resources and ways of camel breeding products use for population of Kazakstan arid areas.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 121-123. ISBN: 1586034731
Descriptors: arid zones, dromedary camels, Bactrian camels, camel breeding, selective breeding methods, camel genetic resources, camel meat, camel milk, milk production, wool, camel fiber products, arid regions, Kazakhstan, Central Asia.

Tibary, A; Anouassi, A; Khatir, H. **Update on reproductive biotechnologies in small ruminants and camelids.** *Theriogenology*. 2005 Aug; 64(3): 618-638. ISSN: 0093-691X. Note: "Proceedings of the Annual Conference of the Society for Theriogenology, held August 9-13, 2005, Charleston, South Carolina."
DOI: http://dx.doi.org/10.1016/j.theriogenology.2005.05.016
NAL call no.: QP252.A1T5
Abstract: Recent advances in reproductive biotechnologies in small ruminants include improvement of methods for in vitro production of embryos and attempts at spermatogonial stem cell transplantation. In vitro production of embryos by IVM/IVF, intra-cytoplasmic sperm injection (ICSI), or nuclear transfer (NT) has been made possible by improvements in oocyte collection and maturation techniques, and early embryo culture systems. However, in vitro embryo production still is not very efficient due to several limiting factors affecting the outcome of each step of the process. This paper discusses factors affecting in vitro embryo production in small ruminants and camelids, as well as preliminary results with the technique of spermatogonial stem cell transplantation.
Descriptors: sheep, goats, llamas, dromedaries, embryo cloning, laboratory techniques, oocytes, sperm injection, nuclear injection, in vitro fertilization, literature reviews.

Yusupov, H. **Camel - history of its domestication.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 33-34. ISBN: 1586034731
Descriptors: dromedary camels, Bactrian camels, history of domestication, archeology regarding camels, draft and working uses, Turkmenistan.

2004

Abbas, AM; Mousa, HM; Lechner Doll, M; Engelhardt, W. v. **Nutritional limitation of camel (*Camelus dromedarius*) production on marginal grassland of Sudan.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 778-790. ISBN: 8190114123

Descriptors: dromedary camels,camel behavior, camel husbandry, camel nutrition requirements, feeding, behavior, grazing, feed intake, feeding preferences, grasslands, seasonal variation, liveweight gain, weight losses, mixed pasture plants, nutrient value, *Cymbopogon nervatus,* Sudan, Arab Countries.

Abdelmadjid Chehma; Longo, HF. **Bilan azote et gain de poids, chez le dromadaire et le mouton, alimentes a base de sous-produits du palmier dattier, de la paille d'orge et du drinn *Aristida pungens*.[Nitrogenous record and weight gains in dromedary and sheep fed with date palm, barley straw, and drinn "*Aristida pungens*" byproducts.]** *Cahiers Agricultures*. 2004; 13(2): 221-226. ISSN: 1166-7699. Note: In French with an English summary.

Abstract: In the following study, both dromedary and sheep showed a positive record for all of the byproducts studied. Nevertheless, weight losses were reported in ovines for dry palms and barley straw, whereas the daily mean liveweight gain (DMG) was nil for dry palms in the dromedary. For the other byproducts studied, DMGs indicate that it is the dromedary that best converts feed into meat, with recorded gains being 5-10 times higher than those found for ovines, and showing values of 00.00 vs. -1.99 g/kg metabolic weight for dry palms, 5.03 vs. 0.63 g/kg metabolic weight for pedicels, 5.76 vs. 0.87 g/kg metabolic weight for drinn, 5.03 vs. -0.51 g/kg metabolic weight for barley straw, 7.15 vs. 1.18 g/kg metabolic weight for Diet I, 5.4 vs. 1.73 g/kg metabolic weight for Diet II, and 3.85 vs. 1.99 g/kg metabolic weight for Diet III. Also, the values yielded for date rubbish-based diets showed that the DMG for ovines increases in proportion to the rate of rubbish used, contrary to the dromedary where the best DMG is found with the weakest rate (25%). Reproduced with permission of CAB.

Descriptors: dromedary camels, sheep, agricultural byproducts, *Aristida pungens*, *Hordeum vulgare*, barley, barley straw, date palm fruits, dates as feed stuff, liveweight gain, nitrogenous compounds, nutrition, nutritive value, straw, liveweight gains, nutritional value, quality for nutrition.

Al Qarawi, AA. **The chronobiological blood parameter changes as correlated to different traits of *Camelus dromedarius* in Saudi Arabia.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 372-377. ISBN: 8190114123

Descriptors: dromedary camels, breeds and breed differences, phenotypes, acid phosphatase, alanine aminotransferase, aspartate, aminotransferase, blood chemistry, blood proteins, calcium, cholesterol, cholinesterase, creatinine, environmental factors, globulins, lipids, calcium, inorganic phosphorus, iron, nitrogen, seasonal variation, serum albumin, summer, triacylglycerols, uric acid, Got, GPT, Saudi Arabia.

Al Qarawi, AA; Mousa, HM. **Lipid concentrations in erythrocyte membranes in normal, starved, dehyrated and rehydrated camels (*Camelus dromedarius*), and in normal sheep (*Ovis aries*) and goats (*Capra hircus*).** *Journal of Arid Environments.* 2004 Dec; 59(4): 675-683. ISSN: 0140-1963
Descriptors: dromedaries, sheep, goats, erythrocytes, cell membranes, lipid content, dehydration (animal physiology), starvation, cholesterol, phospholipids, fatty acids, protein content, hemolysis, blood, parasites, stress tolerance.

Alhadrami, GA. **Effect of rhodes grass *Chloris gayana* height and varieties on in situ dry matter, protein and fibre degradation in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 716-722. ISBN: 8190114123
Descriptors: dromedary camels, camel nutrition, crop production, forage, *Chloris gayana*, plant height, crude fiber, nutrient value, digestibility, dry matter, fiber content, protein content, variety trials, Arab Countries, United Arab Emirates.

Alhadrami, GA. **In situ dry matter and fibre degradation of salt tolerant *Sporobolus* grass hay in camels fed yeast culture.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 738-746. ISBN: 8190114123
Descriptors: dromedary camels, camel nutrition, camel digestion, salt tolerant grass hay, *Sporobolus virginicus*, *Chloris gayana*, digestibility, dry matter, yeast feed supplements, nutritive value, rumen digestion.

Aminu Deen; Sumant Vyas; Mamta Jain; Sahani, MS. **Explanation of no or low sperm motility in camel semen.** *Israel Journal of Veterinary Medicine*. 2004; 59(1/2): 24-27. ISSN: 0334-9152
URL: http://www.isrvma.org/TextPage.aspx?ID=25
Abstract: A study on the collection and evaluation of camel semen was undertaken to assess the possible causes of low sperm motility with special emphasis on the possible adverse effects of contact of camel semen with the artificial vagina (AV) rubber funnel. Aside from the collection of semen over several years using the traditional rubber funnel type, a separate experiment was conducted on 6 camels using a traditional rubber funnel (63 collections) or a camel collection glass (51 collections). Microscopic examinations of the semen revealed that the spermatozoa were densely clustered and entrapped. The spermatozoa were initially immotile but were eventually able to move by oscillation of their tails. Microscopic examination of mixed diluted and chilled semen revealed a heterogeneous picture. In some microscopic fields, sperms were clustered and entrapped, while in other fields, sperms were free and progressively motile. Microscopic picture revealed that the heads of spermatozoa were embedded, tightly secured and appeared to have been glued together with the tails vibrating strongly. Liquefaction of the semen coagulum released the spermatozoa in batches and developed progressive motility. Semen samples collected either with the traditional rubber funnel type AV or camel collection glass did not differ in motility as revealed by T-test. It is concluded that the low sperm motility was due to the coagulation of the semen and entrapment of the spermatozoa. Rubber funnel contact did not affect motility to a significant extent.
Descriptors: dromedary camels,sperm collection, comparison of 2 types of artificial vaginas, sperm motility, collection techniques.

Aminu Deen; Anand Bhati; Sahani, MS. **A note on prospects of improved kind of camel drawn agricultural implements - harrow and cultivator.** *Journal of Camel Practice and Research.* 2004; 11(2): 159-160. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A trial was conducted to determine the working performance of 4 draught dromedary camels (7.5-10. years old) on a disc harrow and a tine cultivator. Total working time, are covered, depth of penetration and force exerted in pulling were recorded. It was shown that total working time before fatigue with the harrow and cultivator averaged 49.86+or-2.32 and 43.26+or-2.06 min, the best individual performances for these equipment were 61.27+or-5.02 and 57.85+or-2.63 min and the lowest performances were 41.63+or-6.59 and 34.5+or-3.96 min, respectively. The force exerted in pulling and the area of land ploughed using these equipment were 127.02+or-4.94 and 164.57+or-6.50 kg and 1730.48+or-79.40 and 1569.5+or-76.76 m2, respectively. In conclusion, both the disc harrow and tine cultivator are heavy for camels to pull and are expensive. Reproduced with permission of CAB.
Descriptors: dromedary camels, draft camels, equipment for draft camels, disc harrow, tine cultivator, difficulty for camels to pull, camel fatigue.

Anderson, DE; Silveira, F; Grubb, T. **Effects of venipuncture and correlation of plasma, serum and saliva cortisol concentration with transportation stress in camelids.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 160-168. ISBN: 8190114123
Descriptors: dromedary camels, alpacas, llamas, intravenous injection stress, cortisol, hydrocortisone, transportation stress, stress response, plasma, serum, saliva.

Arfa, AB; Khorchani, T; Hammadi, M; Chammem, M; El Hatmi, H; El Jeni, H; Abdouli, H; Cheniti, TL. **Digestibilite et ingestion de la vegetation d'un parcours d' halophytes par le dromadaire dans le Sud tunisien.[Digestibility and intake of a halophytic vegetation in camels grazing in southern Tunisian rangelands.]** *Cahiers Options Mediterraneennes.* 2004; 62: 301-305. ISSN: 1022-1379. Note: "Rangeland and Pasture Rehabilitation in Mediterranean Areas. Proceedings of the 11th meeting of the Mediterranean Forage Resources Sub-Network of the FAO-CIHEAM Inter-Regional Cooperative Research and Development Network on Pastures and Fodder Crops, Djerba, Tunisia, 29 October-1 November 2002." In French with an English summary.
Abstract: This study was conducted to evaluate the intake and digestibility in camels grazing on a halophytic vegetation in Southern Tunisia. A formula [I=100 x F/(100-CUD)] was used to estimate the dry matter intake (I) and chromic oxide (Cr< sub>2</ sub>O< sub>3</ sub>; as an indigestible marker) to measure faecal output (F) in 4 camels for a period of one week. Faecal samples were collected twice a day for each season. Digestibility (CUD) was determined by the faecal index developed by Abouli et. al. The dry and organic matter digestibilities of the browsed vegetation varied seasonally (P<0.01). Values were 35.5 and 36.1%, 28.9 and 29.7% and 37.4 and 38.0% in autumn, winter and spring, respectively. The dry matter intake was insignificantly different (P>0.05) between the seasons, the value being 6.2 kg/day/head on average (67.3 g/LW0.75). Reproduced with permission of CAB.
Descriptors: dromedary camels, intake and digestibility, halophytic browse, grazing, fecal testing, chromic oxide, seasonal variation.

Ayalew, W; Rowlands, J. ***Design, Execution and Analysis of the Livestock Breed Survey in Oromiya Regional State, Ethiopia.*** International Livestock Research Institute, Nairobi, Kenya. 2004; v + 253 pp. ISBN: 9291461601

Abstract: This book presents a comprehensive description of the methods used in the planning, execution and analysis of the livestock breed survey conducted in Oromiya Regional State, Ethiopia between 2000 and 2003, as well as baseline set of results of data analysis. It contains 15 chapters. Reproduced with permission of CAB.

Descriptors: dromedary camels, goats, sheep, cattle, horses, donkeys, asses, domesticated birds, poultry, livestock breeding stock survey methods, design, execution, survey analysis, Ethiopia.

Bissa, UK; Yadav, SBS; Beniwal, BK; Sahani, MS. **Losses of female camel calves at different ages from birth to age at first calving.** *Indian Journal of Animal Sciences.* 2004; 74(9): 965-968. ISSN: 0367-8318

Abstract: This study was conducted to determine post calving losses of female calves from birth to age at first calving at different ages. The female calf mortality from birth to age at first calving (AFC) at different ages, 0 to 3 month, 3 months to 1 year, 1 to 2 years, 2 to 3 years and 3 years to AFC were 8.6, 3.3, 5.3, 4.7 and 5%, respectively. Total mortality was 21.89% before they reached the age at first calving. Period of birth have significant effect on mortality in 3 months to 1 year and 1 to 2 year-age group. Month of birth had significant effect on mortality at 0 to 3 months and 2 to 3 years. The culling of female calves from birth to AFC at different ages, 0 to 3 month, 3 months to 1 year, 1 to 2 years, 2 to 3 years and 3 years to AFC were 0.18, 7.2, 11.9, 12.4 and 14.7%, respectively. About 33% of the female calves born were culled due to different reasons, such as congenital defects, deformities, poor growth rate or late maturity, etc., before they reached the breeding herd. Period of birth significantly affected culling in 3 months to 1 year, 1 to 2 years and 2 to 3 years age group. The month of birth had highly significant effect only on culling in 1 to 2 year age group. Reproduced with permission of CAB.

Descriptors: dromedary camels, age, age at first calving, birth, culling, death rate, mortality, seasons.

Cardellino, R; Rosati, A; Mosconi, C. (Editors). **Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004.** *ICAR Technical Series.* 2004; (11): 163 p. ISSN: 1563-2504. ISBN: 9295014065.

Abstract: This proceedings contains 14 conference papers on the breeding, handling systems and milk, meat and fibre production of Bactrian and dromedary camels, llamas, guanacos, alpacas and vicunas in Asia, Africa, Arab Gulf countries and South America. Reproduced with permission of CAB.

Descriptors: camelids, dromedary camels, Bactrian camels, llamas, vicunas, guanacos, alpacas, camelid breeding, animal fibers, meat production, milk production, wool production, Africa, Arab Countries, Asia, South America.

Champak Bhakat; Chaturvedi, D; Raghavendra, S; Nagpaul, PK. **Studies on camel management under various microenvironment of shelter systems.** *Indian Journal of Dairy Science.* 2004; 57(5): 347-353. ISSN: 0019-5146

URL: http://www.indairyasso.org/Journal1/ijds_main.html
Abstract: An investigation was carried out on three male Jaisalmeri camels which were allotted randomly into three comparable shelters in switch over design for 21 final trial days. Three different type of shelters were, 1 - Thatched roofed open type kuchchha shelter(TROTK).2 - Asbestos roof close type concrete shelter(ARCTC). 3 - Loose housing system. Temperature humidity index was higher in macro-environment followed by asbestos roofed, loose house and thatched roofed shelter. The cardinal physiological responses during morning and evening time under three shelters were significantly correlated (P<0.01). Rectal temperature, pulse rate and respiration rate during evening and morning under 3 treatment groups differed significantly (P<0.01). All cardinal physiological responses were significantly (P<0.01) increased after work as compared to pre-work condition. The levels of blood creatinine, and urea were found comparatively lower in the morning than in the evening, while glucose and triglycerides were observed higher in all three shelter groups. The highest percent decrease in both glucose and triglycerides values were found in the evening under ARCTC, tree shelter, TROTK. Overall thatched roofed open type kuchchha shelter is the most economical, followed by loose housing and the asbestos roof close type concrete shelter.
Descriptors: native livestock, male dromedary camels, Jaisalmeri breed, comparative shelter, animal housing, loose housing, thatched roofed Kuchchha shelter, close type concrete with asbestos roofs, shelter environmental management, microenvironments, camel husbandry, body temperature, creatinine, glucose, triacylglycerols, urea.

Champak Bhakat; Chaturvedi, D; Sahani, MS. **Studies on the behavioural pattern of camel calves in different systems of management.** *Journal of Eco Physiology.* 2004; 7(1/2): 17-22. ISSN: 0972-0413
Abstract: Seven camel calves (Bikaneri breed) were selected just after birth and kept in 2 different systems of management, loose housing (LH)/intensive (I) system and semi-intensive system (SI), for 2 months. Different behavioural patterns exhibited by the camel calves were recorded throughout the 24-h period for 7 days in a month for each group at 15-min intervals in a special type of score card developed for this purpose. The analysis of data revealed that total average time involved in feed intake/milk suckling was more (174.92+or-1.85 min.) in SI than in LH conditions. The total average time involved in rumination was 123.20 min in the SI system. The nocturnal rumination time was longer compared to diurnal rumination. The total average time involved in sleeping was more in LH than in SI system. The total average time for idling was less in SI than in LH condition. The total average frequency of defaecation and urination of the camel calves was also more in night than day in both systems of management. The total average frequency of agonistic behaviour of camel calves were less in SI than in LH. The average attempt for drinking was almost similar type in LH (1.32+or-0.11) and SI conditions (2.86+or-0.17). In conclusion, the semi-intensive system is better than the intensive system for camel calf management due to the longer time involved in feeding and other related activities and less time involved in idling activity. Reproduced with permission of CAB.
Descriptors: dromedary camels, calves, comparison study, 2 different, rearing systems, agonistic behavior, calf behaviors, diurnal activity, defecation, urination, drinking, farm management, feeding behavior, nocturnal activity, sleep, physical activity, rumination.

Champak Bhakat; Sharma, N; Sahani, MS. **Influence of camel management systems on the sustainability of small farmers in hot arid region of Thar desert.** *Journal of Eco Physiology.* 2004; 7(3/4): 159-164. ISSN: 0972-0413

Abstract: Data on camel management and trading systems were collected from 104 camel keepers who brought 262 camels to the Ramdev Animal fair [date not given] in Nagour, Rajasthan, India. A total of 32 complete transaction cases were also recorded. Majority of the farmers present at the fair were from Rajasthan (90%). Ten different categories of farmers were recorded. Most of the camel keepers who were interviewed were farmers (91%). Nevertheless, 9% also claimed to be camel businessmen. Camel transactions involved a higher number of male (52%) than female camels (48%). Camels above the 7-year age group were the most representative, with a share of 57% of all the camels traded. Farmers brought in 0-12 camels each to the fair. The Bikaneri breed (90%) was predominant. The average number of camel owned per farmer at the village level was 4.90+or-2.67. The average number of camel brought for sale was 2.54+or-1.11. The average price of camel varied according to age and sex. The average expected price prior to sale was Rs. 9654+or-287, whereas, the average actual price of the transaction was Rs. 8768+or-165. The price at sale was 90% of the expected price. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel production, small farmers, arid zones, marketing, prices, small farms, sustainability, trade, trade fairs, Ramdev Animal Farid, Nagour, Rajasthan, India.

Chehma, Abdelmadjid; Longo, Hamouda Fatma. **Bilan azote et gain de poids, chez le dromadaire et le mouton, alimentes a base de sous-produits du palmier dattier, de la paille d'orge et du drinn Aristida pungens. [Nitrogenous record and weight gains in dromedary and sheep fed with date palm, barley straw, and drinn "*Aristida pungens*" by-products.]** *Cahiers Agricultures*. 2004; 13(2): 221-226. ISSN: 1166-7699. Note: In French.

Descriptors: dromedary, sheep, various feedstuffs tested, agricultural by products, food value, weight gains or losses, dry palms, barley straw, pedicels, drinn, dromedary best converts these feeds stuffs to meat, ovines show weight losses for dry palms and barley straw, date byproducts ovine gains as percentage increases, dromedary daily mean gain found with weakest rate.

Djemali, M. **Camel genetic resources in North Africa.** *ICAR Technical Series.* 2004; (11): 51-59. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."

Descriptors: dromedary camels, camel population, camel production improvement plan, herd size, breeding programs, genetic resources, North Africa.

Edwards, GP; Pople, AR; Saalfeld, K; Caley, P. **Introduced mammals in Australian rangelands: future threats and the role of monitoring programmes in management strategies.** *Austral Ecology*. 2004; 29(1): 40-50. ISSN: 1442-9985. Note: "Biodiversity monitoring in Australia's rangelands, 29 October - 1 November 2002, Alice Springs, Australia."

DOI: http://dx.doi.org/10.1111/j.1442-9993.2004.01361.x

Abstract: In the present paper, we have provided an initial assessment of the current and

future threats to biodiversity posed by introduced mammals (predators and herbivores) inhabiting the Australian rangelands, exploring trends in populations and options for management. Notably, rabbits have declined in recent years in the wake of rabbit haemorrhagic disease, populations of feral camels have increased dramatically and foxes appear to have moved northwards, thereby threatening native fauna within an expanded range. Following on, we developed a framework for monitoring the impacts of introduced mammals in the Australian rangelands. In doing so, we considered the key issues that needed to be considered in designing a monitoring programme for this purpose and critically evaluated the role of monitoring in pest animal management. Finally we have provided a brief inventory of current best-practice methods of estimating the abundance of introduced mammal populations in the Australian rangelands with some comments on new approaches and their potential applications. Reproduced with permission of CAB.
Descriptors: dromedary camels, foxes, rabbits, biodiversity, introduced species, methodology, monitoring, plant pests, rangelands, Australia.

Edwards, Glenn P.; Saalfeld, Keith; Clifford, Bretan. **Population trend of feral camels in the Northern Territory, Australia**. *Wildlife Research*. 2004; 31(5): 509-517. ISSN: 1035-3712
URL: http://www.publish.csiro.au/?nid=144
Descriptors: feral camels, population survey, broad-scale aerial suvey, 20 August and 12 October 2001, distribution and abundance, field techniques, projections of numbers, Southern part of Northern Territory, about 300,000 in Australia, impacts of feral camels, inadequacy of current management practices and issues of long term management, Australia.

El Khasmi, M; Riad, F; Safwate, A; El Abbadi, N; Faye, B; Coxam, V; Davicco, MJ; El Alaoui, K; Barlet, JP. **Thyroxine and insulin-like growth factor-I in milk and plasma of camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 419-427. ISBN: 8190114123
Descriptors: dromedary camels, lactation, young animals, newborn camel calves, blood composition; camel milk, camel milk composition, insulin like growth factor I.

Faye, B. **Dairy productivity potential of camels.** *ICAR Technical Series.* 2004; (11): 93-104. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Abstract: While it is recognized that the camel has the ability to produce more milk than the cow in similar conditions, camel milk productivity is not well known. Data from the literature are scarce, mainly issued from observations in research stations, and more rarely from pastoral areas where performance monitoring is not common. Elsewhere, the data are not homogeneous among the authors: mean daily yield, total yield per lactation, herd average. Therefore comparisons are not easy. Furthermore, there is a high variability of reported productions which leads to suppose a potential for selection on that criterion. This selection is possible but rarely achieved except in the Soviet Union period for dromedary and Bactrian camels. The world production of camel milk was officially estimated at 1.3 million tons in 2002. However, according to the high level of self-consumption and the individual potential, this production could probably be higher (i.e. 5.4 million tons). The individual production

varies between 1 000 and 12 000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is very variable (from 8 to 18 months in general), i.e. longer than that for dairy cattle in similar conditions. Obviously, the feeding and seasonal conditions have an impact on those performances. Some intensified systems found in many places showed good prospects in camel milk production to supply populations from arid lands. Reproduced with permission of CAB.
Descriptors: dromedary camels,lactation, lactation curve, milk production, milk yield, milk yielding animals, performance, USSR.

Franck, SGV; Vall, E; Ibrahim, Y; Faye, B. **La traction cameline, un apport important dans l'evolution des pratiques de traction animale au Niger.[Draft camel power, a major contribution to the development of draft animal practices in Niger.]** *Revue d' Elevage et de Medecine Veterinaire des Pays Tropicaux.* 2004; 57(3/4): 177-179. ISSN: 0035-1865. Note: In In French with a English and Spanish summaries. "L'atelier Traction Animale et Strategies d'Acteurs: Quelle Recherche, Quels Services Face au Desengagement des Etats? Bobo Dioulasso, Burkina Faso, 17-21 Novembre 2003."
Abstract: The use of camels (*Camelus dromedarius*) for draught and carting was developed out of draught practices observed in rural zones of sub-Saharan Africa. The camel represents the ultimate stage of rural intensification. Its use was promoted because it is an answer to sustainable development adapted to available resources in Niger. The present paper presents the tools for camel draught developed by the project 'Technical and institutional strengthening of the camel subsector'. It then describes technical specifications for each draught material. Finally, the strategy adopted to popularize draught camel power is presented.
Descriptors: dromedary camels, animal power, development projects, draft camels, extension, technology transfer, working camels, Africa South of Sahara, Niger.

Gahlot, TK. ***Selected Research on Camelid Physiology and Nutrition***. Published by the The Camelid Publishers, Bikaner, India. 2004; viii + 837 pp. ISBN: 8190114123
Abstract: This 837-page publication is a compilation of previously published papers, primarily written for students, teachers, field veterinarians and scientists seeking information on various aspects of camelid physiology and nutrition. The different topics include: adaptation, stress and dehydration; urine, cerebrospinal fluid, synovial fluid, sweat and blood, as well as camel milk biochemistry; endocrinology; enzymology; haematology; and nutritional and digestive, as well as renal physiology. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, adaptation, camel nutrition, camel physiology, reproductive physiology, stressors, effects of dehydration and sweat glands, camel milk, blood chemistry, cerebrospinal fluid, digestion, endocrinology, enzyme activity, enzymes, hematology, hormone secretion, organ physiology, publications, renal function, stress, stress response, synovial fluid, urine, endocrine secretion, hematology, kidney function.

Gaili, ESE; Al Eknah, MM; Sadek, MH. **Comparative milking performance of three types of Saudi camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 442-447. ISBN: 8190114123
Descriptors: dromedary camels, breed differences, lactation, lactation stage, camel dairy

performance, camel milk production, camel milk yield, camel milk composition, ash, lactose, milk fat yield, milk protein yield, Saudi Arabia.

Gautam, L; Mehta, SC; Gahlot, RS; Gautam, K. **Genetic characterisation of Jaisalmeri camel using microsatellite markers.** *Indian Journal of Biotechnology.* 2004; 3(3): 457-459. ISSN: 0972-5849

Descriptors: Jaisalmeri breed, dromedary camel, 30 unrelated animals, genetic polymorphism, PCR, 6 microsatellite primer pairs were polymorphic, alleles from 2-5, heterozygosity ranged from 0.32 to 0.65, polymorphic information content was 0.268 to 0.588.

Genin, D; Kadri, A; Khorchani, T; Sakkal, K; Belgacem, F; Hamadi, M. **Valorization of date palm byproducts (DPBP) for livestock feeding in Southern Tunisia. I - Potentials and traditional utilization.** *Options Mediterraneennes Serie A, Seminaires Mediterraneens.* 2004; (59): 221-226. ISSN: 1016-121X. Note: In English with a French summary. **"**Nutrition and Feeding Strategies of Sheep and Goats under Harsh Climates. Proceedings of the 9th seminar of the Sub-Network on Nutrition of the FAO-CIHEAM Inter-Regional Cooperative Research and Development Network on Sheep and Goats, Jointly Organized by INRAT, FAO and CIHEAM, with the Collaboration of ICARDA, IRESA, OEP and GIVR, Hammamet, Tunisia, 8-10 November 2001.

Abstract: Date palm byproducts (DPBP) are classically used as a complementary feeding source for livestock by oasian people. However, little is known about traditional practices and methods for a local improvement of the use of DPBP. In this project, we aimed at characterizing: (i) the quantitative and qualitative potentials of these fodder sources; and (ii) the traditional uses of DPBP for livestock feeding. DPBP can be classified in wasted dates, stones, floral stems (lignified tissues supporting date fruits), panicles and leaves. Chemical composition of the byproducts showed that, individually, they were highly unbalanced for animal nutrition (high energy content in the case of wasted dates and stones, high fibre content in the case of regime supports and palms). In both cases, crude protein (CP) content was usually low (3 to 6.5% of dry matter, DM). In vitro dry matter digestibility (IVDMD) of wasted dates and regime supports were 74.5 and 12.3%, 79.7 and 19.6%, and 79.2 and 18.3%, respectively, for sheep, goat and dromedaries. A survey concerning a total of 84 livestock owners in the Nefzaoua region showed that farmers utilized mainly three types of DPBP to supplement small ruminants (wasted dates only (26%), a mix of all DPBP available (36%), and a mix of wasted dates and palms only (25%)). A small proportion of farmers were reported buying date stones for their flocks in local markets but this practice seemed closely linked with the presence of camelids within the herd. Products were usually offered without any treatment (38%), previously soaked in water to improve tenderness (26%) or mixed with straw, grasses or concentrate (19%). Farmers reported using DPBP each year during winter (63%), all the year (26%) or only during dry years (11%). Quantities distributed varied depending on animal species, herd size, and structure of the production unit (0.2 to 1.2 kg/head of small ruminant/day). DPBP were viewed by locals as a relatively good and economic feeding source for small ruminants and dromedaries, using local natural resources and solving part of the problem of the treatment of oasis wastes. 16% of the farmers consider DPBP as a security fodder. Among the limitations, the two main observations concerned were bloating when distributed with concentrates or bran, and seasonal unavailability.

Descriptors: dromedary camels, goats, sheep, potential livestock feed, agroindustrial byproducts, byproducts, of date palm production, feed stuffs, *Phoenix dactylifera,* chemical composition, dry matter, fibre, fiber content, in vitro digestibility, livestock feeding, Tunisia.

Gordon, I. **Pregnancy testing technology.** I. Gordon. *Reproductive Technologies in Farm Animals.* CABI Publishing, Wallingford, UK. 2004; 215-235. ISBN: 0851998623
Abstract: This chapter deals with several aspects of pregnancy testing in livestock. The advantages of pregnancy testing are presented as well as the factors affecting the establishment of pregnancy. The different methods of pregnancy testing (palpation per rectum, progesterone and oestrogen assays, faecal testing, predicting litter size, use of ultrasonics, early dipstick tests, radiography and detection of gonadotropins) are discussed. Reproduced with permission of CAB.
Descriptors: cattle, deer, dromedary camels, goats, horses, pigs, sheep, gestation, pregnancy testing, corpus luteum, embryos, environmental factors, enzyme immunoassay, epidermal growth factor, feces, glycoproteins, gonadotropins, immunology, interferon, litter size, maternal recognition, estrogens, estrus, palpation, placenta, PMSG, progesterone, prostaglandins, radiography, radioimmunoassay, survival, transforming growth factor, ultrasound, dipstick assay, immunoradiometric assay, PMG, pregnant mare serum gonadotropin, radioimmunosorbent assay.

Guerouali, A; Acharbane, R. **Camel genetic resources in Morocco.** *ICAR Technical Series.* 2004; (11): 61-72. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Descriptors: dromedary camels, survey results, characteristics of camels, color, size, milk production, endurance, morphometry, genetics, morphometrics, Morocco.

Guliye, AY; Yagil, R; Hovell, FDD. **Milk composition of Bedouin camels under semi-nomadic production system.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 428-433. ISBN: 8190114123
Descriptors: dromedary camels, lactation, lactation state, camel milk composition, ash, chloride, dry matter, lactose, milk fat percentage, milk production, milk protein percentage, milk quality, osmotic pressure, parity, pH, nomadism, Israel.

Hermas, S. **Genetic and environmental factors affecting camel reproduction.** *Journal of Dairy Science.* 2004; 87(Suppl. 1): 391. ISSN: 0022-0302. Note: "Annual Meeting of the American Dairy Science Association/American Society of Animal Science/Poultry Science Association, St Louis, MO, USA; July 24 -29, 2004."
URL: http://jds.fass.org/contents-by-date.0.shtml
NAL call no: 44.8 J822
Descriptors: camels, camel reproduction, factors affecting reproduction, reproductive performance, genetic variation, environmental factors.

Ismail, ZB; Qureshi, T; Levy, M; Khamas, W; Nour, A. **Preliminary report on some physiological parameters in pregnant female camels (*Camelus dromedarius*) in North America.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 115-122. ISBN: 8190114123

Descriptors: dromedary camels, pregnant female, physiological parameters of pregnancy, reproductive hormone secretion, progesterone, hydrocortisone, insulin, thyroxine, triiodothyronine, alkaline phosphatase, aspartate aminotransferase, blood chemistry, gamma glutamyltransferase, hematology, L iditol dehydrogenase, North America.

Jasra, AW; Mirza, MA. **Camel production systems in Asia.** *ICAR Technical Series.* 2004; (11): 37-49. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."

Abstract: Due to the uneven distribution of the global population (i.e. 18.58 million heads), >80% of camels are found in Africa. Asia is the second largest home of camelids, where 70% of the population is found in India and Pakistan. Both dromedary and Bactrian camels are found in Asia; however, the former is in majority. All camel habitats are unique ecological niches, i.e. extremely marginalized and highly inaccessible temperate as well as tropical deserts. The physical/physiological uniqueness of camels enabled humans to inhabit these deserts, hence pastoralism involving exclusively camels or mixed livestock remains the dominant use of natural resources in arid and semiarid ecosystems of Asia. Within these ecological specificities, camel production is the mainstay of livelihood. Being an extremely low input animal, the camel has been supporting the main subsistence needs of pastoralists across large-scale biological and geopolitical diversities, The camel has been the key resilient animal species of pastoralists to absorb various external shocks particularly climatic and geopolitical vulnerabilities. The adventitious vulnerabilities of camel pastoralists had led to various camel production systems. The Camel Applied Research and Development Network (CARDN) in Pakistan has documented the camel production systems in the Indo-Pakistan subcontinent based on sociocultural terms. Hence, three categories of camel pastoralists have been recognized which are migratory or nomadic pastoralists, transhumant or semi-migratory pastoralists and sedentary or household pastoralists. The International Livestock Research Institute (ILRI) has reported 10 global livestock production systems. The agro-ecologically based production systems are also directly applicable to camel production systems in Asia. The livestock production systems have been redefined in a commercial context. These include (a) traditional rural livestock production, (b) commercial milk production and (c) desert/rangeland production. These are equally good to be used for camel production. The camel production systems have very recently been reported as (a) traditional systems, (b) periurban systems and (c) ranching of camels. Although a very complex issue, we need to define camel production systems based on universally agreed parameters. As a consequence of vulnerability to external forces, the socioeconomic transformation of the camel as well as other pastoralists is emerging as a gradual phenomenon, hence the treasures of biological and cultural diversity are at stake. This changing scenario calls for appropriate collaborative research and development initiatives to optimize the general understanding of key external shocks like the macroeconomic framework, demography and access to land and other natural resources, drought and other climate-related events. Reproduced with permission of CAB.

Descriptors: dromedary camels, Bactrian camels, herd size, livestock production, camel farming systems; livestock numbers; milk production, nomadism, pastoralism, socioeconomics, transhumance, Asia, India, Pakistan.

Kadim, IT; Osman Mahgoub. **Camelid genetic resources. A report on three Arabian Gulf countries.** *ICAR Technical Series.* 2004; (11): 81-92. ISSN: 1563-2504. ISBN: 9295014065.
Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Descriptors: dromedary camels, taxonomy of Arabian dromedaries, types and breeds, racing camels, body measurements, numbers, herd sizes, Sultanate of Oman, UAE, Saudi Arabia.

Kappeler, SR; Heuberger, C; Farah, Z; Puhan, Z. **Expression of the peptidoglycan recognition protein, PGRP, in the lactating mammary gland.** *Journal of Dairy Science*. 2004 Aug; 87(8): 2660-2668. ISSN: 0022-0302
URL: http://jds.fass.org/contents-by-date.0.shtml
NAL call no: 44.8 J822
Abstract: The peptidoglycan recognition protein, PGRP, known as an intracellular component of neutrophils, has been isolated from camel (*Camelus dromedarius*) milk by acid precipitation followed by heparin-sepharose affinity chromatography of the supernatant. The mean concentration in milk was about 120 mg/L. It decreased during lactation by 19% and increased in the event of severe mastitis by 45%. The protein bound to lactic acid bacteria and other gram-positive bacteria with an affinity similar to that reported for the human and murine orthologs, although the isoelectric point of the molecule was distinctly higher at pH 9.02. The N-terminus of mature camel PGRP was determined as NH2-ArgGluAspProPro-CO2H. Calculated and measured molecular masses were both 19.1 kDa, excluding the possibility of posttranslational modifcation or binding of cation ligands. The peptide probably builds a homotrimer at high concentration. The corresponding mRNA was isolated from lactating mammary gland tissue, and 5.3 kbp of the corresponding gene was sequenced. Similarities were found to the camel lactoferrin gene with regard to sites of expression and to the region 5' upstream to the gene.
Descriptors: dromedaries, camel milk, mammary glands, gene expression, binding proteins, antibacterial properties, purification, nucleotide sequences, amino acid sequences, gene expression regulation, mastitis, mammary gland function.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS; Singh, R. **Effect of water restriction on serum aldosterone and cortisol in dromedary camel during winter and summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 129-138. ISBN: 8190114123
Descriptors: dromedary camels, water restriction, dehydration, stress response, effects on serum aldosterone and cortisol, acclimatization, heat adaptation, aldosterone, arid climate, rehydration with drinking water, gluconeogenesis, hydrocortisone, mineralocorticoids, seasonal variation, summer and winter, stress.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Changes in body fluid compartments during dehydration and rehydration in Indian dromedaries (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 58-67. ISBN: 8190114123
Descriptors: dromedary camels, blood volume, body fluids compartments, body water, water metabolism, dehydration physiological, erythrocytes, extracellular fluids, interstitial fluids, winter, rehydration, dehydration, seasonal variations summer, winter, wate deprivation, water intake, water metabolism, India.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS; Singh, R. **Thyroid hormone profile in dromedary camel in winter and summer during water restriction.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 147-155. ISBN: 8190114123
Descriptors: dromedary camels, blood chemistry, thyroid gland, thyroid profile, thyroid hormones, thyroxine, triiodothyronine, seasonal comparison, winter, summer, water restriction effects, fasting, dehydration, drinking water, cholesterol, drinking, drinking water, hormone secretion, metabolism, rehydration, seasonal variation, stress, stress response.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Effect of seasonal dehydration on creatinine clearance in Indian dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 642-652. ISBN: 8190114123
Descriptors: dromedary camels, creatinine, dehydration, heat stress, kidneys, renal clearance, renal function; rehydration, seasonal variation, stress, stress response, water metabolism, India.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Effect of hot and cold ambience on renal clearances of electrolytes in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 634-641. ISBN: 8190114123
Descriptors: dromedary camels, kidneys, kidney function, acid base equilibrium, chloride, dehydration, electrolytes, glomerular filtration rate, ion balance, sodium, potassium, rehydration, renal clearance, renal function, seasonal variation, water metabolism, water intake, cation anion balance, seasonal changes, seasonal fluctuations.

Khorchani, T; Hammadi, M; Genin, D; Sakkal, K; El Jani, H; Abdouli, H. **Valorization of date palm byproducts (DPBP) for livestock feeding in Southern Tunisia. II - Characteristics and digestibility of DPBP-based silages.** *Options Mediterraneennes Serie A, Seminaires Mediterraneens.* 2004; (59): 227-232. ISSN: 1016-121X. Note: In English with a French summary. **"**Nutrition and Feeding Strategies of Sheep and Goats under Harsh Climates. Proceedings of the 9th seminar of the Sub-Network on Nutrition of the FAO-CIHEAM Inter-Regional Cooperative Research and Development Network on Sheep and Goats, Jointly Organized by INRAT, FAO and CIHEAM, with the Collaboration of ICARDA, IRESA, OEP and GIVR, Hammamet, Tunisia, 8-10 November 2001.
Abstract: The cultivation of the date palm in Tunisia and the sorting of dates leave impor-

tant quantities of date palm byproducts (DPBP) which are wasted dates (dried dates, parthenocarpic dates, etc.), stones, stems and leaves. The use of wasted dates and stones as a complementary feed source for livestock by oasian people can improve the feeding calendar of livestock during the long period of the year. However, these byproducts are unbalanced. The present work aimed to determine the conservation of DPBP as silage to enhance the use of readily available byproducts of datepalm, to expand the period of their use and to suggest complements or more balanced diets. Two types of silage were prepared. Silage 1 (S1) was composed of chopped stems (45%), wasted dates (35%), wheat bran (15%) and urea (5%). The urea was dissolved in water (10% volume/weight of the mixture before humidification). In silage 2 (S2), stems were replaced by chopped palm leaves. Ingredients were mixed carefully and silages were preserved at ambient temperature in hermetic bags for 2 months. The 2 silages had a characteristic and typical good silage smell. The neutral detergent fibre was 50.3+or-3.2 and 46.5+or-1.2% for S1 and S2, respectively. For in vitro digestibility studies, rumen liquors were taken from 3 animal species (sheep, goat and camel) slaughtered in slaughterhouses. In vitro dry matter digestibility (DMD) of S1 and S2 were 55.5+or-0.6 vs. 50.3+or-2.2% and 48.6+or-1.1 vs. 50.1+or-4.7% and 53.0+or-0.1 vs. 53.4+or-4.2%, respectively, for sheep, goat and camel. In order to determine the in vivo digestibility of the two silages, 4 local kids were used during 2 successive periods. In vivo DMD of S1 were significantly higher (P<0.05) than S2 (51.5+or-1.2 vs 47.9+or-2.5) and in vivo organic matter digestibility (OMD) were not different (P>0.05) for the two silages (54.9+or-2.1 vs. 58.1+or-2.6). The mean daily dry matter intake averaged 46.0+or-8.8 and 65.5+or-8.7 g/kg W0.75, respectively, for S1 and S2. This technique seems to be appropriate for DPBP conservation and enhancement use.
Descriptors: dromedary camels, goats, sheep, livestock feedstuff, *Phoenix dactylifera*, agricultural byproducts from date palms, dates, silage, digestibility, fiber, in vitro digestibility, nutritive value, silage making, silage quality, Tunisia.

Kinne, J; Nagy, P; Wernery, U. **Serum copper levels in dromedaries after long term exogenous copper supplementation.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 813-818. ISBN: 8190114123
Descriptors: dromedary camels, camel nutrition, mineral supplements, blood chemistry, copper, mineral nutrition, nutritive value, Arab Countries.

Kohler Rollefson, I; Rathore, HS. **Indigenous versus official knowledge, concepts and institutions: Raika pastoralists and the outside world.** *Nomadic Peoples.* 2004; 8(2): 150-167. ISSN: 0822-7942
URL: HTTP://www.berghahnbooks.com/journals/np
Abstract: This paper is concerned with the 'indigenous knowledge' about livestock of the Raika pastoralists in Rajasthan, India, and how this indigenous knowledge articulates with the official, state-backed concepts of veterinary and animal scientists about the same subject. The paper draws attention to the very real divide that often exists between the protagonists of these two types of knowledge. With the help of three main examples (on the concepts of 'animal health', 'domestic animal diversity' and 'camel milk'), the paper shows how different conceptual frameworks result in a communicational impasse and how this failure to establish a dialogue across the boundaries of knowledge systems renders the interventions of the Raj-

asthan government in the livestock production sector largely ineffective. Reproduced with permission of CAB.
Descriptors: livestock, indigenous knowledge about animal health, animal production, breeds, camel milk, pastoralism, Rajasthan, India.

Kradin, NN. **The transformation of pastoralism in Buryatia: the Aginsky Steppe example.** *Inner Asia.* 2004; 6(1): 95-109. ISSN: 1464-8172
URL: http://www.erica.demon.co.uk
Abstract: This article deals with the structure of the pastoral economy of East Trans-Baikalian Buryats (Aginsky region). The herd structure used to include the five basic species of domestic animals of Eurasia: sheep, cattle, horses and, more rarely, goats and camels. A horse was of the utmost economic and status significance. However, the number of sheep and goats was larger. The pastoral groups owned the land and the nomads migrated with their herds along their traditional seasonal routes. In the last quarter of the 19th century, the influence of the Russian economy on the Buryat nomadic economy began to increase. In the USSR, these processes were more intensive. A complete sedentarization of Buryat society took place. Agriculture was developed and nearly one-quarter of the pastures were used as arable lands. The pastoral economy changed from subsistence to one that was guided by the market. Since wool and meat were valuable commodities new breeds of sheep were raised, and the number of sheep increased greatly thereby giving rise to degradation of pastures. The ecological crisis did not develop on a large scale only because political (collapse of the USSR) and economic crises were ahead of it. As a result, the cattle-breeding and livestock economies of the Aginsky Buryats have fallen into decay. At present, although a crisis situation has been held back, progress is not observed.
Descriptors: camels, sheep, goats, horses, cattle,agricultural development, grazing livestock, pastures, herd size, land ownership, livestock numbers, pastoralism, rural economy, settlement, structural change, transhumance, Russia.

Kuria, SG; Gachuiri, CK; Wanyoike, MM; Wahome, RG. **Effect of mineral supplementation on milk yield and calf growth of camels in Marsabit District of Kenya.** *Journal of Camel Practice and Research.* 2004; 11(2): 87-96. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A study was conducted in Ngurunit and Kargi locations of Marsabit district in Kenya to determine the effect of mineral supplementation on milk yield and calf growth of settlement-based dromedary camels. Two mineral supplements were formulated, one comprised of locally collected, ground bones mixed with locally available natural salt (containing calcium, phosphorus, magnesium, copper, iron, zinc, potassium and sodium) and the other of commercial ingredients (containing the above-mentioned minerals plus cobalt). 59 and 56 camels in early lactation and their calves were selected at Kargi and Ngurunit, respectively. Of these, 22 and 21 camels were randomly assigned the commercial supplement while 12 and 11 were assigned the local supplement at Kargi and Ngurunit, respectively. There were 25 and 23 control camels in Kargi and Ngurunit, respectively. Each dam was individually fed 200 g of mineral supplement daily for 190 days. During the data collection period, milk yield measurements were taken at weekly intervals and calves weighed monthly. It was shown that supplemented camels produced higher (P=0.000) milk yield than controls in Ngurunit

(3.2 vs. 2.3 litres/day, respectively). In Kargi, the mean milk yield for supplemented and control camels was similar (P>0.05) at 2.6 litres/day. Calves from the supplemented dams grew faster (P=0.000) than the controls, gaining 441.3 and 424.8 g/day compared with 275.7 and 307.7 g/day for controls in Kargi and Ngurunit, respectively. It is suggested that mineral deficiency exists among the Rendille camels in Marsabit. However, this problem could be reduced by the judicial use of locally available raw material. Reproduced with permission of CAB.

Descriptors: dromedary camels, young camels, milk production, milk yield, camel feeding, trace element deficiencies, mineral deficiencies, feed supplements, growth weight, live weight gain, mineral supplements, calcium, cobalt, copper, iron, magnesium, phosphorus, potassium, salt, sodium, zinc, Kenya.

Kuria, SG; Wanyoike, MM; Gachuiri, CK; Wahome, RG. **Indigenous camel mineral supplementation knowledge and practices on manyatta based camel herds by the Rendille pastoralists of Marsabit district, Kenya.** *Livestock Research for Rural Development.* 2004; 16(7): article 51. ISSN: 0121-3784

Abstract: A study was conducted to document the traditional mineral supplementation strategies on Manyatta (settlement) based camel milking herds by the semi-settled Rendille pastoralists of Marsabit district in Kenya. During the survey, 33, 28, and 30 respondents were individually interviewed in Kargi, Korr and Ngurunit locations of the district respectively. The results indicated that a combination of rain water standing on salty soils referred to as marmar, and forages growing on such soils were the key sources of mineral supplements to Manyatta based camels, with commercial mineral supplements playing only a minor role. Salty water and forages located within a 15 km grazing radius of the camels were used mainly during the wet season, while commercial salts were used during dry periods. Natural salty water springs and moderately salty boreholes were also used during the dry season. The findings suggested that while Rendille pastoralists knew the importance of mineral supplementation and could describe the deficiency signs, the major salty water springs in the area were beyond reach for most of Manyatta based camels, predisposing them to multiple minerals deficiency. Enhanced grazing and watering management could ameliorate this problem in the short term. In the long term however, there was need for a mineral supplement to be made available to the Manyatta based camels in order to meet their mineral requirements. Reproduced with permission of CAB.

Descriptors: dromedary camels, rain water, forage, mineral deficiencies, mineral supplements, pastoralism, surveys, Kenya.

Kuria, SG; Wahome, RG; Gachuiri, CK; Wanyoike, MM. **Evaluation of forages as mineral sources for camels in western Marsabit, Kenya.** *South African Journal of Animal Science.* 2004; 34(3): 180-188. ISSN: 0375-1589

Abstract: A survey to identify forage mineral sources for settlement-based camels was carried out in the semiarid rangelands of the southwestern Marsabit district of Kenya during the dry and wet periods [date not given]. The respondents included men and boys who were responsible for the herding and watering of camels in the area. Identification of the mineral sources was followed by field verification, sampling and analyses for minerals. A table of mineral composition of the sources was compiled. Over 80% of preferred forage species had calcium,

phosphorus, magnesium, potassium, sodium, iron and cobalt concentrations above the recommended levels during both dry and wet seasons at all the study sites. Eight to 50% of the forage samples were adequate in terms of copper (Cu) and zinc (Zn). Although some forages perceived as important mineral sources by pastoralists had high mineral levels, they were not consumed by camels, mainly due to their limited availability or palatability. Some of the preferred forage species also had limited temporal availability. In conclusion, forages are important sources of minerals for grazing camels in the study area. Apart from Cu and Zn, the forages can potentially satisfy the daily requirements of camels for the studied minerals. A need to create awareness among the camel herders about mineral contents of forage species as a guide in grazing management is emphasized. Reproduced with permission of CAB.
Descriptors: dromedary camels, browse plants nutrition of forage plants, surveys of trace minerals, calcium, cobalt, copper, forage, iron, magnesium, phosphorus, potassium, sodium, zinc.

Lechner Doll, M; Hoffrogge, P; Dycker, C; Zine Filali, R; Engelhardt, W v. **Digesta flow in dehydrated camel.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 450-452. ISBN: 8190114123
Descriptors: dromedary camels, digesta, feed intake, fore stomach, dehydration, physiological, osmolarity, rehydration, saliva, salivation, stomach motility; water deprivation; water intake.

Mahamat, H; Mukani, WO; Mboloi, MM; Guya, SO; Krombaritis, GE. **Pregnancy diagnosis in the dromedary camel (*Camelus dromedarius*) based on a competitive progesterone enzyme linked immunosorbent assay (ELISA).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 660-664. ISBN: 8190114123
Descriptors: dromedary camels,pregnancy diagnosis, analytical methods, blood chemistry, diagnostic techniques, ELISA, pregnancy, progesterone levels, gestation.

Mekonnen, GA. **Meat production potential of Issa type camels under traditional management systems in Eastern Ethiopia.** *Bulletin of Animal Health and Production in Africa.* 2004; 52(4): 215-220. ISSN: 0378-9721. Note: In English with a French summary.
Abstract: The study was conducted to assess the meat production potential of the Issa type of camel in Eastern Ethiopia, which were raised under traditional management and depended on bushes and shrubs for their diet. Data analysed were from mature adult camels (>10 years old) slaughtered in the Dire Dawa municipal abattoir (n=108). Before slaughter, the live weights of the camels were estimated using Boue's technique. The average live weights were 444.8 and 439 kg while the average carcass weights were 327 and 261.5 kg respectively for males and females. Both the live and carcass weights differed significantly between males and females (P<0.05). The live to carcass weight ratio (L:C) calculated for males and females were 1:0.54 and 1:0.48 respectively. The average weights of the forequarters, hindquarters, and the hump were 71.6+or-11.6, 60.8+or-8.8 and 7.5+or-4.4 kg for males and 62.8+or-9.9, 54.1+or-14.9 and 7.4+or-2.9 kg for females respectively. The different cuts for males were superior in weight to those of the females; however, a significant difference (P<0.05) was seen only for the weights of fore quarters, neck, muscles of the back (longissimus dorcis, fascia and

associated muscles) and pectoral plus ventral abdominal muscles.
Descriptors: dromedary camels, Issa type camels, camel husbandry, camels for meat production, body weight, carcass quality, carcass weight, sex differences, slaughter premiums, Abyssinia, Ethiopia.

Mesbah, SF; Kafi, M; Nili, H; Nasr Esfahani, MH. **Spontaneous parthenogenesis and development of camel (*Camelus dromedarius*) oocytes.** *Veterinary Record*-London. 2004 Oct 16; 155(16): 498-500. ISSN: 0042-4900
URL: http://veterinaryrecord.bvapublications.com
NAL call no: 41.8 V641
Descriptors : dromedary camels, oocytes, reproduction, development, parthenogenesis.

Minoia, P; Sciorsci, RL; Zarrilli, A; Campanella, F. **An overview of the interaction of endogenous opioids with camel metabolism and production.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 181-185. ISBN: 8190114123
Descriptors: dromedary camels, endogenous opioids, endorphins, camel metabolism, calcium chemoreceptors, ion exchange, metabolism, mineral metabolism, neuropeptides, neurotransmitters, opioid peptides, signal transduction.

Moaeen ud Din, M; Abdullah, M; Javed, K; Ahmad, N. **Feeding behavior of camel under stall feeding.** *JAPS, Journal of Animal and Plant Sciences.* 2004; 14(3/4): 74-76. ISSN: 1018-7081
URL: http://www.biosciences.elewa.org/JAPS/index.html
Abstract: The present study was designed to investigate the feeding behavior of young and adult female camel in the canal irrigated area of Punjab under stall-feeding. Animals were fed on unconventional feed resources comprising of tops of carrot, potato and spinach. The herd consisted of 2 males, 21 adult females and 12 calves. Animals were divided in two groups i.e. adult female and young stock. Only female adult and young stock was included in the study. Data were collected on the basis of "Visual Appraisal Chart of Feed Selection Behavior among the Animals" and "Visual Appraisal Chart of Behavior among the Animals of different Groups and within Group" and was analyzed by applying Frequency distribution and Correlation using SPSSReg. The results of the Frequency distribution on feed selection revealed that animals preferred succulent feed to dry feed and leafy feed over stem feed. However there was comparatively more selection for feed in adult females as compared to young animals (70% vs. 63.33%). The results of the Frequency distribution regarding herd mates' behavior indicated that for most of the time, animals showed unresponsive behavior (81.11%), irrespective of the age factor towards the activities of other herd mates. This means that animals did not pay attention to other animals of the herd while feeding. Both in case of adult female and young animals there was pronounced unresponsiveness towards the other herd mates (83.33%) and this figure was still high (76.67%) when compared with the behavior of senior members (adult females) of the herd to junior (calves) at feeding time.
Descriptors: dromedary camels, behavior, carrots, *Daucus carota*, *Solanum tuberosum*, *Spinacia oleracea*, dry feeding, dry feeds, feeding behavior, feeding preferences, potatoes, spinach, stalls.

Mohamed, HE. **A note on vitamin A, C and E status in healthy and infected camel calves.** *Journal of Camel Practice and Research.* 2004; 11(1): 65-66. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was undertaken to determine the major causative agents of camel morbidity in the Butana area as well as the plasma levels of retinol, alpha -tocopherol and L-ascorbate in relation to the health status of animals. A field survey was conducted from January to December 2000. A total of 594 camels (*Camelus dromedarius*), aged one month to 1.5 years, were inspected for diseases. Blood and faecal samples were taken for confirmatory tests. Out of the camels examined, 283 were healthy and 311 suffered from various diseases. The prevalence levels of haemonchosis, trichostrongylosis, pneumonia and trypanosomiasis in camels were 32.0, 20.8, 7.8 and 5.7%, respectively. All the infected camels had reduced plasma levels of antioxidants. Trypanosomiasis caused the highest degree of reduction in the plasma antioxidant status of camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, hemonchosis, trichostrongylosis, pneumonia and trypanosomiasis, *Trypanosoma evansi*, etiology, alpha tocopherol, antioxidants, ascorbic acid, disease prevalence, disease surveys, epidemiology, retinol, vitamin E , Vitamin A, vitamin A1, vitamin C.

Mohamed, HE; Beynen, AC. **The effect of starvation on the status of vitamin C in Sudanese camels (*Camelus dromedarius*).** *Folia Veterinaria.* 2004; 48(4): 191-192. ISSN: 0015-5748
URL: http://oldwww.uvm.sk/dept/journals/folia.html
Abstract: We investigated the effect of food deprivation on vitamin C status in Sudanese camels. The camels were found to show a decrease in both plasma and leukocyte ascorbic acid levels only after five days of starvation. In comparison with other dietary-ascorbate-independent animals, camels may show a resistance to starvation-induced lowering of ascorbic acid status. The present data indicate that in camels the urinary excretion of vitamin C is depressed after prolonged fasting. Reproduced with permission of CAB.
Descriptors: dromedary camels, experimental starvation, ascorbic acid status, vitamin C, blood chemistry, leukocytes, urination, Sudan.

Moolchandani, A; Ghosal, AK; Bhatia, JS; Kataria, N; Sareen, M. **Effect of sodium bicarbonate supplementation on physicochemical aspects of saliva in camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 563-564. ISBN: 8190114123
Descriptors: dromedary camels, saliva, salivation, chemical composition, feed supplements, alpha amylase, ammonium nitrogen, sodium bicarbonate, calcium, chloride, electrolytes, inorganic phosphorus, magnesium, nitrogen, nonprotein nitrogen, pH, physicochemical properties, potassium, proteins, urea.

Moolchandani, A; Ghosal, AK; Bhatia, JS; Kataria, N; Sareen, M. **Effect of season on physico-chemical properties of saliva in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 504-508. ISBN: 8190114123
Descriptors: dromedary camels, ssalavation, saliva, seasonal effects, physioco-chemical properties, enzyme activity, alpha amylase, ammonium nitrogen, urea, ash, bicarbonates, calcium,

chloride, inorganic phosphorus, nitrogen, nonprotein nitrogen, pH, potassium, proteins, summer and winter seasonal variations.

Moslah, M; Hammadi, M; Khorchani, T. **Productivite de l'elevage camelin dans les parcours du Sud tunisien**. **[Productivity of dromedaries in South Tunisia rangelands.]** *Cahiers Options Mediterraneennes*. 2004; 62: 343-347. ISSN: 1022-1379. Note: Rangeland and Pasture Rehabilitation in Mediterranean Areas. Proceedings of the 11th meeting of the Mediterranean Forage Resources Sub-Network of the FAO-CIHEAM Inter-Regional Cooperative Research and Development Network on Pastures and Fodder Crops, Djerba, Tunisia, 29 October-1 November 2002." In French with an English summary.
Abstract: In Tunisia, the majority of dromedary camels are traditionally kept on natural arid rangelands. The chronic scarcity of fodder crops leads to a delayed age at first calving (3-4 years), a decreased reproductive career (5-7 years), a low daily liveweight gain (about 300 g) and a low milk production (about 2 litres/day). Some modifications to the actual rearing system (supplementation and calf removal) can improve some of these parameters and thus increase the income.
Descriptors: dromedary camels, age at first calving, animal feeding, animal production, feed supplements, income, liveweight gain, milk production, milk yield, pastoralism, productive life, rangelands, reproductive performance, Tunisia.

Nagpal, AK; Roy, AK; Kiradoo, BD; Raja Purohit; Sahani, MS. **Voluntary feed intake and nutrient utilization of adult female racing camels during exercise and at rest.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 795-800. ISBN: 8190114123
Descriptors: female dromedary camels, racing camels, camel nutrition, feed intake, comparison between exercise and at rest, *Vigna aconitifolia*, camel nutrition, blood chemistry, crude protein.

Nagpal, AK; Raja Purohit; Kiradoo, BD; Sahani, MS. **Studies on stall-feeding of groundnut fodder vis-a-vis 3-tier silvi-pasture grazing in arid ecosystem.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 709-715. ISBN: 8190114123
Descriptors: dromedary camels, camel husbandry, camel nutrition, stall feeding with groundnut fodder, peanut fodder, *Arachis hypogaea*, silvo-pasture grazing system, comparison study, arid climate ecosystems, cost benefit analysis, crop production, digestibility, growth-rate, liveweight gain, nutrient value, roughage, sustainability, Arab countries.

Nagpal, AK; Saini, N; Roy, AK; Sahani, MS. **Nutrient utilization in camels fed sewan (*Lasiurus sindicus*) grass with or without ardu (*Ailanthus excelsa*) leaves.** *Indian Journal of Animal Nutrition*. 2004; 21(2): 111-114. ISSN: 0970-3209
Abstract: Five young Bikaneri camels (2 years old, 297.2+or-8.6 kg BW) were offered dry chaffed sewan (*Lasiurus sindicus*) grass ad lib in phase I for 30 days followed by supplementation of dry Ardu (*Ailanthus excelsa*) leaves at 1.0 kg/head/day in phase II for 30 days. The DM intake in phase I was 2.19+or-0.22 kg/day or 0.78+or-0.08% BW which increased to 3.36+or-0.12 kg/day or 1.18% BW in phase II. Supplementation also improved (P<0.01)

DM digestibility -9.52+or-15.64% in phase I to 45.34+or-1.67% in phase II. Significant (P<0.01) increase in DCP and ME intake was observed on ardu leaves supplementation to sewan grass in phase II. Water intake was also higher in phase II (7.83+or-0.6 litres/day) than in phase I (6.47+or-0.89 litres/day). No significant difference was observed between 2 phases in respect of serum glucose, total protein, albumin, urea, cholesterol, triglycerides, sodium, potassium, chloride, calcium except phosphorus. The results indicated the beneficial effort of tree leaves supplementation on nutrient utilization and growth in young camels fed only grass diet. Reproduced with permission of CAB.
Descriptors: dromedary camels, young animals, growth, animal feeding, *Ailanthus excelsa,Lasiurus scindicus*, blood chemistry, blood serum, crude protein, digestibility, dry matter, feed intake, feed supplements, leaves, metabolizable energy, nutritive value, water intake.

Nourani, H; Khodakaram Tafti, A. **Pathological study of ovaries of non-pregnant camels (*Camelus dromedarius*) slaughtered in Iran.** *Journal of Camel Practice and Research.* 2004; 11(2): 109-113. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was undertaken to investigate the pathological changes and prevalence of ovarian abnormalities of camels in Yazd, Iran [date not given]. The ovaries of 96 non-pregnant dromedary camels of unknown history were collected and examined grossly and histopathologically. The pathological changes observed included paraovarian cysts (2.08%), follicular cysts (2.08%), haemorrhagic cysts (1.04%), intrafollicular haemorrhage (5.2%), ovarian hydrobursitis (1.04%), oophoritis (3.12%) and benign cystic teratoma or dermoid cyst (1.04%). A serous cystadenoma was also diagnosed in the ovary of a dromedary camel. This is the first reported case of ovarian serous cystadenoma. Additionally, on the basis of gross and histopathological characteristics, this study suggests and presents two hypotheses: the occurrence of ovarian hydrobursitis due to haemorrhage of atretic follicles and the existence of a probable relationship between ovarian luteinized haemorrhagic cyst and cystic hyperplastic endometritis in dromedary camels.
Descriptors: dromedary camels, adenoma, cysts pathological, disease prevalence, disease surveys, epidemiological surveys, epidemiology, hemorrhage, histopathology, neoplasms, ovarian cysts, ovarian diseases, ovarian follicles, ovaries, bleeding, cancers, disease surveillance, hemorrhage, Iran.

Onjoro, PA; Njoka Njiru, EN; Ottaro, JM. **Status of minerals in the soils, water, forage, blood, milk, urine and faeces of free-ranging camels (*Camelus dromedarius*) in Northern Kenya during the dry season.** *International Journal of Agriculture and Rural Development.* 2004; 5: 121-128. ISSN: 1595-9716
URL: http://ajol.info/index.php/ijard
Abstract: A survey was conducted in Northern Kenya during two dry seasons to assess the concentrations of mineral elements essential for milk production. Samples of soil, water, forage, milk and blood were collected from June to September 2000 and analysed for Ca, P, Mg, Cu and Co. Mineral concentrations ranged as follows; Ca; 20.1-193.0, 85.2-170.0, 50.0-172.7, 22.0-100.0, 116-139.0 and 1.37, P; 17.0-123.0, 10.7-33.1, 28.0-45.0, 13-44.4 and 88.6-90.1, Mg; 3.50-17.0, 8.0-22, 8.3-32.0, 3.0-15.3, 8.9-14.2 and 8.0-14.0, Co;

0.01-0.0.62, 0.04-0.14, 0.38-0.08, 0.06-0.12 and 0.06-0.13, Cu; 0.054-0.715, 0.03-17.0, 0.01-0.39, 0.10-0.23, 0.09-0.18, 0.07-0.15 and 0.05-.14 for forage, blood, faeces, urine and milk respectively. Mineral concentrations in water, and soils are also presented. The water, soil, forage, blood, Milk, urine and faeces from the different herds had varying mineral composition (P<0.5). In blood and urine the locality did not affect the mineral concentrations statistical (P<0.05). The blood and forage Ca and Mg levels are adequate while the levels of P, Co and Cu are below the recommended levels for ruminants. The minerals most likely to be less than required for camel production are P, Co, Cu and K (not measured). The camels seem to be suffering from the imbalance in Ca:P ratios and low Co and Cu in the forages. They may be trying to coop with the imbalance by excreting more Ca in faeces and urine, and concentrating the blood mineral levels. Camel trace mineral requirements may be low but severe deficiency was not observed. Reproduced with permission of CAB.
Descriptors: dromedary camels, free ranging, dry season, forage, mineral content analysis, sampling of body tissues, feces, soil testing, water, forage testing, blood chemistry, urine, calcium, cobalt, copper, magnesium, phosphorus, milk production, mineral deficiencies, phosphorus, Kenya.

Rahbarizadeh, F; Rasaee, MJ; Moghadam, MF; Allameh, AA; Narang, SA; Sadeghizadeh, M. **Induction of immune response in *Camelus bactrianus* and *Camelus dromedarius* against MUC1 - peptide produced heavy-chain antibodies with efficient combining properties.** *Journal of Camel Practice and Research.* 2004; 11(1): 1-9. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Camelidae are known to possess antibodies devoid of light chains and C< sub>H</sub>1 domains. Antigen-specific fragments of these heavy-chain IgGs (VHH) are of great interest in biotechnology applications. The first example of successfully raised heavy-chain antibodies in Camelus dromedarius and Camelus bactrianus against the MUC1 peptide were reported in this paper. Camels (n=2) were immunized against cancerous tissue and peptide conjugated to bovine serum albumin. Both conventional and heavy-chain IgG antibodies were produced in response to MUC1-peptide. Enzyme linked immunosorbent assays (ELISAs) and Western blotting for MUC1 peptide conjugated to BSA, deglycosylated human milk fat globule membrane (HMFG) and cancerous breast tissues were established to investigate the titre development. Three subclasses of IgG in both camels were separated chromatographically. All three subclasses of IgG in both camels were bound to the MUC1 peptide. This study demonstrated specific in vitro targeting of MUC1 peptide by camel heavy-chain antibodies. It might open new prospective for their future and practical application as tumour-targeting tools, due to their small size and soluble behaviour. Reproduced with permission of CAB.
Descriptors: Bactrian camels, dromedary camels, antibodies, IgG, immune response, immunity, immunization, mucins, cancers, ELISA, Western blot MUC1, neoplasms, peptides.

Rahim, AGA. **Utilization of some browse plants of Eastern Sudan by camel and goat.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 802-812. ISBN: 8190114123
Descriptors: dromedary camels, goats, camel nutrition, nutrient requirements, browse behavior, forage quality, nutritive-value, crude protein, digestibility, dry matter, dry season,

feed intake, feed supplements, mineral content, mineral metabolism, rumen, rumen digestion, rumen metabolism, browse plants, species differences, water content, sesame, beniseed, *Acacia Senegal*, *Capparis decidua, Maerua crassifolia*, *Sesamum indicum*, *Ziziphus spinachrista*, *Blepharis*, *Blepharis lineariifolia*, Arab Countries, Sudan.

Rahim, SEAA; El Nadi, AH. **Sexual pheromones in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 227-229. ISBN: 8190114123
Descriptors: dromedary camels, communication between animals, pheromones, pregnancy, sex pheromones, urine, urine analysis, volatile fatty acids, gestation.

Saleh, MA; El Sokkary, GH; Abdel Razik, ARK. **Circulating steroids and proteins in Egyptian oasis pregnant camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 139-146. ISBN: 8190114123
Descriptors: dromedary camels, females, pregnancy, progesterone, parturition, estrogens, blood-chemistry, blood proteins, globulins, hormone secretion, hydrocortisone, cortisol, endocrine secretion immunoglobulins, oases, serum albumin, steroids, Bedouins, Egypt.

Salem, HAH; Serur, BH; Amer, HA. **Estradiol, progesterone and thyroxine in follicular fluids of normal, cystic and atretic follicles of nonpregnant camels in Saudi Arabia.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 218-222. ISBN: 8190114123
Descriptors : estradiol, progesterone, thyroxine, non-pregnant females, blood-chemistry, cystic and atretic follicles, follicular fluid, pathological, hormone secretion, ovarian cysts, ovarian follicles, ovaries, progesterone, Saudi Arabia.

Schelling, E; Diguimbaye, C; Daoud, S; Nicolet, J; Zinsstag, J. **Seroprevalences des maladies zoonotiques chez les pasteurs nomades et leurs animaux dans le Chari-Baguirmi du Tchad.[Seroprevalences of zoonotic diseases in nomads and their livestock in Chari-Baguirmi, Chad.]** *Medecine Tropicale*. 2004; 64(5): 474-477. ISSN: 0025-682X. "Nomades au Tchad: proceedings of a workshop held at N'Djamena, Chad, November 2002." Note: In French with an English summary.
Abstract: The seroprevalences of brucellosis and Q-fever were evaluated in humans and livestock in three Chadian nomadic communities, i.e., Fulani cattle breeders and Arab camel and cattle breeders. The survey was carried out in 1999 and 2000. The total number of human sera and animal sera tested were 911 and 1637, respectively, for antibodies against *Brucella* spp. and 368 and 613, respectively, for *Coxiella burnetii*. Sixteen brucellosis positive human sera resulted in a seroprevalence rate of 2%. Male participants were significantly more often brucellosis seropositive than females. No association was found between brucellosis serostatus and physical findings or reported symptoms. Positive brucellosis serology was more frequent in cattle (seroprevalence, 7%) than in camels (1.4%) and small ruminants (0.5%). Fifteen human sera from 11 Arab camel breeders and 4 Arab cattle breeders were positive for Q-fever (seroprevalence below 1%). Being a camel breeder was a significant risk factor for Q-fever seropositivity. Camels had the highest Q-fever seroprevalence (73%) among livestock species.

Reproduced with permission of CAB.
Descriptors: nomadic people, humans, cattle, camels, ruminants, women, men, sex differences, antibodies, *Brucella,* brucellosis, epidemiology, Q fever, *Coxiella burnetii*, seroprevalence, zoonoses, abattoir fever, Balkan grippe, Derrick Burnet disease, Nine Mile fever, pneumorickettsiosis, quadrilateral fever, query fever, Tchad, zoonotic infections, Chad.

Sghaier, M. **Camel production systems in Africa.** *ICAR Technical Series.* 2004; (11): 19-30. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Abstract: Camel breeding had and continues to be of major social and cultural importance in Africa which holds more than 80% of the world camel population. The largest flocks are found in Somalia, Sudan, and Ethiopia. According to FAO statistics, an average of one camel for 20 persons is found in Africa. Nowadays, camel products are increasingly having advantages compared to other traditional animal products. In fact, camel products markets (meat, milk, hair, and leather) are expanding because of health problems of the other products of cattle, sheep and poultry. The meat and milk produced biologically and naturally are becoming substitutes of the traditional products. This paper analyses the camel production systems in Africa and especially the production machine (number, species, etc), practices and production, profitability (financial and economic aspects), marketing and commercialization. Finally, the main socioeconomic advantages and constraints will be analyzed. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel breeding, camel production, economics, marketing of camel-based products, profitability, Ethiopia, Somalia, Sudan, Abyssinia.

Shaheen, HM. **The effect of feed and water deprivation on ingestive behaviour and blood constituents in camels: comparison with sheep and goats.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 32-47. ISBN: 8190114123
Descriptors: dromedary camels, goats, sheep, species comparison study, feed and water deprivation, effects on ingestive behavior, blood chemistry, blood proteins, blood sugar, body temperature, body weight, dehydration, rehydration, drinking water, fasting, feed intake, feeding behavior, globulins, hematocrit, ion balance, nitrogen, osmotic pressure, potassium, serum albumin, sodium, urea.

Shaheen, HM. **Feeding and drinking of camels, sheep and goats after different periods of deprivation.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 13-26. ISBN: 8190114123
Descriptors: dromedary camels, sheep, goats, stressors, feed deprivation, fasting, water deprivation, rehydration, water intake, refeeding, adaptation, camel behavior, camel nutrition, behavior, blood chemistry, hematology, concentrates, drinking water, erythrocytes, feeding behavior, feeding preferences, roughage, species differences.

Singh, GP. **Modelling pasture utilization and grazing/browsing management for maximizing camel production.** *Indian Dairyman.* 2004; 56(11): 39-43. ISSN: 0019-4603
Abstract: In this article, a system approach including modelling is described for pasture utilization and grazing/browsing management for camel production in an arid zone. The following topics are discussed: system approach, system description and modelling, system research, creating a new system, management strategies, grazing management, system efficiency, two layer model and rotational management. The two-tier system of pasture is desirable, suitable and economical for camel keepers, because pasture land is decreasing at a fast rate. However, proper grazing/browsing management and supplementing of deficient nutrients through agricultural byproducts will provide balanced nutrients to camels, which in turn can improve their productivity.
Descriptors: dromedary camels, arid zones, pasturing, browsing behavior, feed conversion efficiency, feed supplements, grassland management, grasslands, grazing herbage, biomass production, liveweight gain, models.

Tibary, A; Anouassi, A. **Standing castration in camels.** *Journal of Camel Practice and Research.* 2004; 11(2): 125-127. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A standing castration technique was performed on twelve 24-28-month-old dromedary camels. After administration of a low doses of xylazine for sedation and butorphanol tartrate for analgesia, the patient was placed in stocks and castration was performed as per routine. The advantages of this technique include the lack of need for general anaesthesia or casting which may result in medical problems or injuries. The technique described was performed without complications. Reproduced with permission of CAB.
Descriptors: dromedary camels, young males, standing castration technique, surgical testes removal, anesthesia, analgesics, butorphanol, xylazine.

Tinson, AH; Gorde, A; Kuhad, KS; Kuldeep Singh; Al Masri, J. **Study of plasma thiamine (B<ovid:sub>1</ovid:sub>) levels in the racing dromedary camel in relation to source and route of administration of B<ovid:sub>1</ovid:sub> supplementation.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 509-515. ISBN: 8190114123
Descriptors: racing dromedary camels, intravenous injection, thiamin, vitamin supplements, feed supplement concentrates, diets, hay.

Tragardh, C; Persson, E; Dahlborn, K. **A comparative study on the morphology and immunohistochemical localization of cytoskeletal proteins in the sweat glands of the camel (*Camelus dromedarius*), goat (*Capra hircus*) and horse (*Equus caballus*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 101-102. ISBN: 8190114123
Descriptors: dromedary camels, goats, horses, animal anatomy, skin, sweat glands, cellular morphology, immunohistochemical localization of cytoskeletal proteins, tissue ultrastructure, species differences.

Tuteja, FC; Dixit, SK; Deen, A; Bhati, A; Sahani, MS. **Mineral antioxidant status in serum and its relationship with somatic cell count in camel milk.** *Journal of Camel Practice and Research.* 2004; 11(1): 59-62. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The mineral antioxidant status in serum of camels was determined as well as its relationship with somatic cell count in camel milk (n=128). Serum Zn, Cu, Co and Fe concentrations were estimated in lactating camels (n=32) having different types of mastitis. The mean serum Zn, Cu and Fe concentrations varied insignificantly between negative, subclinical, nonspecific and clinical groups (P<0.05). However, Co concentrations in these groups were 1.78+or-0.12, 1.34+or-0.18, 1.26+or-0.10 and 0.70+or-0.41 micro g/ml, respectively. Differences were significant among the groups (P< 0.05). The mean serum Zn, Cu, Co and Fe status of animals having SCC up to 2.0, 2.0-5.0, 5.0-10.0 and >10 lactations were 1.30+or-0.60, 1.56+or-0.16, 2.42+or-0.84 and 1.78+or-0.12; 2.37+or-0.32, 1.35+or-0.08, 3.93+or-0.46 and 1.26+or-0.10; 2.45+or-0.51, 0.95+or-0.14, 2.77+or-0.71 and 1.41+or-0.16; and 2.60+or-0.95, 1.25+or-0.25, 3.35+or-1.33 and 1.35+or-0.29 micro g/ml, respectively. The difference in serum Zn, Fe and Co concentrations varied insignificantly among the groups (P<0.05). However, Cu concentration varied significantly among the groups (P<0.05).
Descriptors: dromedary camels, lactation, mastitis, subclinical mastitis, camel milk, antioxidants, blood-serum, disease prevalence, epidemiology, somatic cell count, trace elements, zinc, cobalt, copper, iron.

Wardeh, MF; Mahmoud-Dawa. **Camels and dromedaries: general perspectives.** *ICAR Technical Series.* 2004; (11): 1-9. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Abstract: Camels continue to be the preferred livestock species for utilizing extreme dry land areas. They are part of the culture of pastoralists and make up over 30% of the livestock biomass in such areas. Pastoralists are seeking new systems of using their animals and increasing sales of surplus rather the keeping them to accumulate wealth. The Camel Applied Research and Development Network succeeded in highlighting the case of the marginalized camel production sector, encouraged the establishment of the camel producers association, supported 17 national research systems and developed many technical packages for improving camel productivity. Further activities would be focused on strategies and policies, technology transfer, marketing of camels and camel products and capacity building.
Descriptors: camels, dromedary camels, dryland animal production, pastoralists, Camel Applied Research and Development Network, camel producers association, improvement strategies, technology transfer, marketing of camel based products, capacity building.

Wernery, U; Juhasz, J; Nagy, P. **Milk yield performance of dromedaries with an automatic bucket milking machine.** *Journal of Camel Practice and Research.* 2004; 11(1): 51-57. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was carried out to monitor the milk yield of 16 dromedaries over a period of one year after milking with an automated bucket milking machine. The equip-

ment and its use for milking dromedaries were described. Dromedaries from the United Arab Emirates were milked with an automatic bucket milking machine for 12 months. The camels produced a total of 21 959.9 kg of milk, with a daily milk yield of 4.8 kg each. The milk production followed a typical lactation curve, with the highest milk yield during the first months after parturition. Milk production was significantly dependent on how often the camels were milked per day and when milking was started after parturition. It seemed that young camels could be removed from the dam without any negative effect on the milk yield. A herringbone stand was suitable for milking dromedaries. Dromedaries entered the stand effortlessly without any sign of stress or discomfort. The automatic bucket milking machine using 25 mm silicon liners was accepted by all the 16 dromedaries without any problem. Machine stimulation was abandoned, because it caused udder oedema and mastitis. Hand stimulation of 2-3 min was well-accepted, and the duration was decreased after the first 3 months of milking. Milking was performed with a vacuum pressure of 36-40 kPa and a pulsation rate of 60:40 with 90 cycles per min. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel milk, bucket milking machines, dairy performance, equipment, herringbone parlors, lactation curve, mammary edema, mastitis, milk production, milk yield, milk yielding animals, milking, milking machines, United Arab Emirates.

Zhao, XX; Chen, BX. **Peripartal endocrine changes in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 223-226. ISBN: 8190114123
Descriptors: dromedary camels, gestation, pregnancy, parturition, blood chemistry, endocrine glands, estradiol, hormone secretion, hydrocortisone, progesterone, cortisol, ductless glands, endocrine secretion, estradiol.

Zidan, M; Pabst, R. **Histological, histochemical and immunohistochemical study of the haemal nodes of the dromedary camel.** *Anatomia Histologia Embryologia.* 2004; 33(5): 284-289. ISSN: 0340-2096
URL: http://www.blackwell-synergy.com/issuelist.asp?journal=ahe
NAL call no: SF761.Z4
Abstract: Haemal nodes are lymphoid organs found in various mammals and some birds. The structure of haemal nodes has been described in a number of species but not yet in the camel. Therefore, haemal nodes from 10 camels were studied histologically and tested for CD3, CD22, major histocompatibility complex (MHC) class II/DR, alpha -smooth muscle actin and for the demonstration of acid and alkaline phosphatases. The haemal nodes were of spherical or kidney shape with one or two hili and had a capsule and trabeculae of connective tissue and smooth muscles. The main parenchyma was composed of a cortex and a medulla. The cortex was formed from lymphoid follicles and diffuse interfollicular lymphocytes. The medulla consisted of lymphoid cords separated by medullary sinuses. The interfollicular lymphocytes and those in the medullary cord were CD3-positive. The lymphoid follicles showed CD22-positive cells. MHC class II/DR was expressed by most cells of the parenchyma. There were also subcapsular, peritrabecular and medullary blood sinuses. Afferent and efferent lymphatics and lymphatic sinuses were also found. Acid phosphatase-positive cells were localized mainly in the marginal, the interfollicular zone and in the medullary cord. Alkaline phosphatase positivity was observed in the endothelium of the sinuses and in the lymphoid

follicles. The morphology of these organs in the camel allows a classification as haemolymph nodes and suggests involvement in blood and lymph filtration. Reproduced with permission of CAB.

Descriptors: dromedary camels,acid phosphatase, alkaline phosphatase, hemolymph nodes, histochemistry, histology, immunohistochemistry, lymphocytes, major histocompatibility complex, morphology, acid phosphomonoesterase, alkaline phosphomonoesterase, alpha smooth muscle actin, CD22+ lymphocytes, CD3+ lymphocytes, hemal nodes, hemolymph nodes, histocompatibility complex.

Ziv, A; Sod Moriah, UA; Creveld, C van; Yagil, R. **Is water restriction a stress for camels (*Camelus dromedarius*)?** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 203-210. ISBN: 8190114123

Descriptors: dromedary camels, animal husbandry, blood chemistry, body weight, dehydration, drinking water, hematocrit, hydrocortisone, rehydration, stress, stress factors, stress response, water, cortisol, hematocrit.

Arabian: Products

2008

Awad, RA; Hamzawi, LF; Desouky, MM; Soryal, KA. **Oxidative stability and some functional properties of goat and camel milk fat fractions**. *Annals of Agricultural Science Cairo.* 2008; 53(1): 231-243. ISSN: 0570-1783. Note: In English with an Arabic summary.

Abstract: Goat and camel milk fat were fractionated into liquid and solid fractions by crystallization at 15, 25 for goat and 30, 40 degrees C for camel milk fat. Fatty acid profile and functional properties (slip melting point, specific gravity, refractive index, cholesterol content, iodine value, and yield) were analyzed for original butter oil and obtained fractions. Stability of fat to oxidation during induction & acceleration periods using TBA and polymorphism using x-ray diffraction pattern were also characterized. Fatty acid profile of camel milk fat indicated lower values of total short chain (TSC) and higher values of total long chain (TLC) and unsaturated fatty acids (USFA) compared to goat milk fat. The short chain and unsaturated fatty acids migrate to the liquid fractions being higher at lower fractionation temperature whereas, long chain saturated fatty acids concentrated in solid fractions being increased with increasing the fractionation temperature. Slip melting points were statistically significantly differed among all fractions being higher in camel fractions. Goat milk fat fractions showed higher specific gravity, with lower refractive index, cholesterol content and iodine values compared to camel fat being lowest in solid fractions. Camel milk fat and its fractions were highly stable against oxidation (up to 20 days) and longer shelf-life especially its solid fractions, as compared to goat fat. The liquid fractions of both goat and camel fat exhibited lower stability to oxidation (higher TBA) than their butter oil or solid fractions. The X-ray diffraction pattern of camel milk fat fractions showed different peaks compared to goat fat fractions. Liquid fractions of camel fat showed both beta and beta ' polymorphs while liquid goat fat fractions showed only beta polymorph. The magnitude of X-ray diffraction peaks increased with increasing the fraction melting point being more pronounced in camel fractions which indicate higher crystallization and stability of camel fat. Reproduced with permission of CAB.

Descriptors: camel milk, goat milk, butterfat, cholesterol, crystallization, fatty acids, fractionation, functional properties, iodine, long chain fatty acids, melting point, milk fat, oxidation, physicochemical properties, short chain fatty acids, specific gravity, stability, storage life, unsaturated fatty acids.

Elgadi, ZAM; Gadir, WSA; Dirar, HA. **Isolation and identification of lactic acid bacteria and yeast from raw milk in Khartoum State (Sudan).** *Research Journal of Microbiology.* 2008; 3(3): 163-168. ISSN: 1816-4935

URL: http://www.academicjournals.net/fulltext/jm/2008/163-168.pdf

Abstract: Fifty four raw milk samples were collected from cows (farms and venders), goats, ewes and camels of different areas of Khartoum state and microbiologically analyzed. Enumeration and isolation were carried out anaerobically at 37 degrees C on MRS and M17 for

lactococci and lactobacilli, respectively, aerobically on PDA at 25 degrees C for yeasts and on nutrient agar for total viable count at 37 degrees C. Sixty three MRS and M17 isolates and six PDA Isolates were purified and kept at 4 degrees C for further identification. The presence of Lactic Acid Bacteria (LAB) and yeast was confirmed by colonial morphology, microscopy in addition to other biochemical tests. The ability of streptococci to ferment and assimilate sugars was carried out using the API kits. The results obtained showed that the milk samples contained lactobacilli and lactococci in the range of 3.50-6.30 and 3.48-6.21 log mL-1, respectively, yeast in the range of 2.00-3.95 log mL-1 and the total viable count in the range of 3.48-7.98 log mL-1. Lactic acid bacteria isolated from milk samples belonged to lactobacillus and streptococcus genera. The homofermentative lactobacilli from cows and camel milk were tentatively identified as *Lactobacillus plantarum* and *Lb. acidophilus*, whereas the hetero fermentative ones from cows, goats and ewes milk were found to be *Lb. fermentum*. The homofermentative streptococci isolated from all milk samples were tentatively identified as *Streptococcus cremoris* and *Streptococcus lactis*, whereas the only heterofermentative strain from camel milk was found to be *Leuconostoc lactis*. Yeasts which were only isolated from cow's milk, were identified as *Debaryomyces hansenii* (4 strains), *Kluveromyces lactis* (one strain) and *Saccharomyces rouxii* (one strain).

Descriptors: sheep, camels, goats, camel milk, ewe milk, goat milk, milk fermentation, bacterial count, lactic acid bacteria, yeasts, microscopy, morphology, *Debaryomyces hansenii,Kluyveromyces marxianus* var *lactis*, *Lactobacillus acidophilus*, *Lactobacillus fermentum*, *Lactobacillus plantarum*, *Lactococcus*, *Lactococcus lactis* subsp *cremoris*, *Lactococcus lactis* subsp *lactis*; *Leuconostoc lactis*, *Saccharomyces rouxii*, *Streptococcus*.

Elgadi, ZAM; Gadir, WSA; Dirar, HA. **Isolation and identification of lactic acid bacteria and yeast from raw milk in Khartoum State (Sudan).** *Research Journal of Microbiology.* 2008; 3(3): 163-168. ISSN: 1816-4935

URL: http://www.academicjournals.net/fulltext/jm/2008/163-168.pdf

Abstract: Fifty four raw milk samples were collected from cows (farms and venders), goats, ewes and camels of different areas of Khartoum state and microbiologically analyzed. Enumeration and isolation were carried out anaerobically at 37 degrees C on MRS and M17 for lactococci and lactobacilli, respectively, aerobically on PDA at 25 degrees C for yeasts and on nutrient agar for total viable count at 37 degrees C. Sixty three MRS and M17 isolates and six PDA Isolates were purified and kept at 4 degrees C for further identification. The presence of Lactic Acid Bacteria (LAB) and yeast was confirmed by colonial morphology, microscopy in addition to other biochemical tests. The ability of streptococci to ferment and assimilate sugars was carried out using the API kits. The results obtained showed that the milk samples contained lactobacilli and lactococci in the range of 3.50-6.30 and 3.48-6.21 log mL-1, respectively, yeast in the range of 2.00-3.95 log mL-1 and the total viable count in the range of 3.48-7.98 log mL-1. Lactic acid bacteria isolated from milk samples belonged to lactobacillus and streptococcus genera. The homofermentative lactobacilli from cows and camel milk were tentatively identified as *Lactobacillus plantarum* and *Lb. acidophilus*, whereas the hetero fermentative ones from cows, goats and ewes milk were found to be *Lb. fermentum*. The homofermentative streptococci isolated from all milk samples were tentatively identified as *Streptococcus cremoris* and *Streptococcus lactis*, whereas the only heterofermenta-

tive strain from camel milk was found to be *Leuconostoc lactis*. Yeasts which were only isolated from cow's milk, were identified as *Debaryomyces hansenii* (4 strains), *Kluveromyces lactis* (one strain) and *Saccharomyces rouxii* (one strain).
Descriptors: sheep, camels, goats, camel milk, ewe milk, goat milk, fermentation, bacterial count, lactic acid bacteria, yeasts, microscopy, morphology, *Debaryomyces hansenii,Kluyveromyces marxianus* var *lactis*, *Lactobacillus acidophilus*, *Lactobacillus fermentum*, *Lactobacillus plantarum*, *Lactococcus*, *Lactococcus lactis* subsp *cremoris*, *Lactococcus lactis* subsp *lactis*; *Leuconostoc lactis*, *Saccharomyces rouxii*, *Streptococcuslactis, Debaryomyces hansenii Debaryomyces hansenii.*

Haddadin, MSY; Gammoh, SI; Robinson, RK. **Seasonal variations in the chemical composition of camel milk in Jordan.** *Journal of Dairy Research* . 2008 Feb; 75(1): 8-12. ISSN: 0022-0299
DOI: http://dx.doi.org/10.1017/S0022029907002750
NAL call no: 44.8 J823
Abstract: The principal chemical components of milk from the Arabian camel (*Camelus dromedarius*) were monitored in Jordan over one year. The analyses included total solids, fat, protein, vitamins, minerals and organic acids. Large seasonal variations in total solids and fat were apparent, with maxima in mid-winter of 139 and 39p"0 g/l, respectively, and minima in August of 102 and 25p"0 g/l. These differences may be sufficient to alter the sensory properties of the milk, and the fat: casein ratio may need standardisation for cheesemaking. The mean values of trace elements like zinc (5p"8 mg/l), iron (4p"4 mg/l) and manganese (0p"05 mg/l) in Jordanian camel milk could provide valuable additions to the diet of urban populations, as could the mean concentration of vitamin C (33 mg/l). The levels of organic acids were generally higher than in bovine milk and, as with all the constituents of the milk, there were discernible patterns linking concentration and season of the year.
Descriptors: dromedary camels, camel milk, milk composition, seasonal variation, chemical composition, milk analysis, manganese, Jordan.

Hoffman, LC. **The yield and nutritional value of meat from African ungulates, Camelidae, rodents, ratites and reptiles**. *Meat Science.* 2008 Sept; 80(1): 94-100. ISSN: 0309-1740
DOI: http://dx.doi.org/10.1016/j.meatsci.2008.05.018
NAL call no: TX373.M4
Abstract: The current knowledge of the yield and nutritional (proximate and fatty acid) composition of meat derived from African ungulates, camelidae, rodents, ratites and reptiles is reviewed. Although most of the species discussed give low cholesterol levels consistent with their low meat lipid contents, the tegu lizard gives a very low level (18.2mg/100g tissue). The fatty acid profiles of the various species all have low saturated fatty acids and high polyunsaturated fatty acids resulting in favourable saturated to polyunsaturated fatty acid ratios. Although the springbok, camel, ostrich and crocodile are marketed and exported to sophisticated markets, the rodents are the species that show most promise in becoming large commercial commodities. Not only is their meat desirable and nutritional, but they are also highly adaptable to extensive and intensive production systems.
Descriptors: camels, llamas, alpacas, rodents, ratites, reptiles, alternative livestock, meat

carcasses, carcass yield, fatty acid composition, lipid content, cholesterol, meat quality, *Hydrochaeris hydrochaeris*, *Myocastor coypus*, nutritive value.

Kadim, IT; Mahgoub, O; Purchas, RW**. A review of the growth, and of the carcass and meat quality characteristics of the one-humped camel (*Camelus dromedaries).*** *Meat Science.* 2008; 80(3): 555-569. ISSN: 0309-1740
NAL call no: TX373.M4
Abstract: The dromedary camel is a good source of meat especially in areas where the climate adversely affects the performance of other meat animals. This is because of its unique physiological characteristics, including a great tolerance to high temperatures, solar radiation, water scarcity, rough topography and poor vegetation. The average birth weight of camels is about 35 kg, but it varies widely between regions, breeds and within the same breed. The meat producing ability of camels is limited by modest growth rates (500 g/day). However, camels are mostly produced under traditional extensive systems on poor levels of nutrition and are mostly slaughtered at older ages after a career in work, racing or milk production. Camels reach live weights of about 650 kg at 7-8 years of age, and produce carcass weights ranging from 125 to 400 kg with dressing-out percentage values from 55% to 70%. Camel carcasses contain about 57% muscle, 26% bone and 17% fat with fore halves (cranial to rib 13) significantly heavier than the hind halves. Camel lean meat contains about 78% water, 19% protein, 3% fat, and 1.2% ash with a small amount of intramuscular fat, which renders it a healthy food for humans. Camel meat has been described as raspberry red to dark brown in colour and the fat of the camel meat is white. Camel meat is similar in taste and texture to beef. The amino acid and mineral contents of camel meat are often higher than beef, probably due to lower intramuscular fat levels. Recently, camel meat has been processed into burgers, patties, sausages and shawarma to add value. Future research efforts need to focus on exploiting the potential of the camel as a source of meat through multidisciplinary research into efficient production systems, and improved meat technology and marketing. Reproduced with permission from CAB.
Descriptors: dromedary camel meat, carcass quality, color, food analysis, food composition, live weight, growth, meat products, meat quality, nutrient content, sensory evaluation, reviews.

Konuspayeva, G; Lemarie, E; Faye, B; Loiseau, G; Montet, D. **Fatty acid and cholesterol composition of camel's (*Camelus bactrianus*, *Camelus dromedarius* and hybrids) milk in Kazakhstan.** *Dairy Science and Technology*. 2008; 88(3): 327-340. ISSN: 1958-5586. Note: In English with summaries in Chinese and French.
URL: http://www.dairy-journal.org
Abstract: The fatty acid composition and cholesterol content of 22 camel's milk samples from different regions of Kazakhstan were determined, in different seasons and with different camel species (Bactrian, dromedary and hybrids). Camel milk fat differed from mammalian fats by its high content of the long-chain fatty acids C14:0, C16:0, C18:0 and C18:1. Great differences in fatty acid composition occurred between regions. Short-chain fatty acids (C8:0 and C10:0) were in higher proportion in spring and long-chain fatty acids (C17:0 and C17:1) in autumn. Dromedary milk had a higher proportion of C17:0iso and C18:1 than

Bactrian milk. The ratio of unsaturated/saturated acid was more favorable in camel's milk compared with that of cows or other mammalians. All of these parameters gave a nutritional advantage to camel's milk, although it had a higher content of cholesterol (37.1 mg 100 g-1) than cow's milk. Multivariate analysis allowed the identification of four types of fatty acid profiles with a clear opposition between the samples rich in short-chain fatty acids and the samples rich in long-chain fatty acids. These results confirmed that environmental and farming conditions allowed modulation of the lipid composition of camel's milk. Reproduced with permission of CAB.

Descriptors: cows, dromedary camels, Bactrian camels, camel milk, composition, cholesterol levels, milk fats, fatty acids, hybrids, lipids, short chain fatty acids, butterfat, Central Asia, Kazakhstan.

Sallam, Khalid Ibrahim; Mohammed Ali Morshedy, Alaa Eldin. **Organochlorine pesticide residues in camel, cattle and sheep carcasses slaughtered in Sharkia Province, Egypt.** *Food Chemistry.* 2008 May 1; 108(1): 154-164. ISSN: 0308-8146

DOI: http://dx.doi.org/10.1016/j.foodchem.2007.10.066

NAL call no : TX501.F6

Abstract: Organochlorine pesticide residues were determined in a total of 270 meat samples; comprising the muscle, liver, and kidney collected from 90 carcasses (30 each of camel, cattle and sheep) slaughtered in Sharkia Province, Egypt. All samples were analyzed for their residual contents of DDT compounds (DDTs), hexachlorocyclohexane isomers (HCHs), lindane (d-HCH), aldrin, dieldrin, endrin, hexachlorobenzene (HCB), toxaphene, and chlordane compounds. The results indicated that 54.4% (49/90), 51.1% (46/90), 47.8% (43/90), 44.4% (40/90), 33.3% (30/90) and 15.6% (14/90) of the examined carcasses were contaminated with DDTs, HCHs, lindane, aldrin, dieldrin and endrin, respectively. The other contaminants (HCB, toxaphene, and chlordane) were only present in less than 10% of the analyzed carcasses. Amongst the three meat animal species examined, the incidence of contamination as well as the residual concentrations of all the pesticides detected in camel carcasses were lower than those detected for cattle and sheep. The contamination level of the studied organochlorines followed the order: DDTs>HCHs>lindane>dieldrin>aldrin>e ndrin>toxaphene>HCB>chlordane; while the order for the contamination in the analyzed organs was liver>kidney>muscle. Heat treatment of some selected samples (boiling for 1.5h) produced overall reductions of 40.4%, 55.0%, 32.4%, 33.5%, 29.2%, 42.7% and 38.2% in DDTs, lindane, dieldrin, aldrin, endrin, toxaphene and HCB contents, respectively. The residual contents of the organochlorines detected in all of the contaminated samples analyzed from the three different species were well below the respective maximal permissible limits set by local or international organizations.

Descriptors: camels, cattle, sheep, meat carcasses, meat quality, food analysis, organochlorine pesticides, pesticide residues, DDT (pesticide), lindane, aldrin, dieldrin, endrin, hexachlorobenzene, toxaphene, chlordane, hexachlorocyclohexane isomers, camel tissues, cooking, Egypt.

2007

Abdoun, KA; Amin, ASA; Abdelatif, AM. **Milk composition of dromedary camels (*Camelus dromedarius*): nutritional effects and correlation to corresponding blood parameters.** *Pakistan Journal of Biological Sciences.* 2007; 10(16): 2724-2727. ISSN:
URL: http://www.ansinet.org/pjbs
Abstract: This study has been conducted in order to study the possible correlations between the nutritional value of plants selected by camels during the dry and green season and the corresponding blood and milk composition of the dromedary camels. The study has been conducted on 50 indigenous Arabian camels of different age and kept under natural range in Southern Darfur. The dromedary camels selected plants with significantly ($p<0.05$) higher crude protein content during the dry season and kept the serum albumin concentration and milk protein content at the same levels as those observed during the green season. However, the significantly ($p<0.05$) higher lipogenic content (ether extract + crude fibre) of the plant selected during the dry season resulted in significantly ($p<0.05$) higher serum triacylglycerides concentration and significantly ($p<0.05$) higher milk fat content compared to that of the green season. Although, the camels selected plants with significantly ($p<0.05$) higher nitrogen free extract content during the dry season, the plasma glucose level and the milk lactose content were significantly ($p<0.05$) reduced compared to that of the green season. The significantly ($p<0.05$) lower ach content of the plants selected during the dry season resulted in significantly lower serum calcium + phosphorus concentration, but did not reflect on the ash content of the milk. The results indicate that despite camels selectivity and unique adaptation to arid conditions, the milk lactose-and fat content were affected by the nutritional scarcity during the dry season. Therefore, it could be beneficial to provide energy-rich feed supplemented with calcium and phosphorus to camels kept under dry tropical conditions.
Descriptors: dromedary camels, camel milk, crude protein, feed supplements, hematology, lactose, lipids, milk composition, milk fat, butterfat, milk protein, nutritive value, phosphorus, calcium, plant composition, triacylglycerols, tropics, chemical constituents of plants, hematology, lipins, milk constituents, milk sugar, nutritional value, quality, for nutrition, triglycerides, tropical-countries, tropical zones.

Al Majali, AM; Ismail, ZB; Al Hami, Y; Nour, AY. **Lactoferrin concentration in milk from camels (*Camelus dromedarius*) with and without subclinical mastitis.** *International Journal of Applied Research in Veterinary Medicine.* 2007; 5(3): 120-124. ISSN: 1542-2666
Abstract: The purposes of this study were to investigate the levels of lactoferrin in 180 normal and 132 mastitic camel milk samples and to elucidate the effect of age, lactation stage, presence of pathogens, and somatic cell counts (SCC) on the concentration of lactoferrin in camel milk using radial immunodiffusion test. The mean log concentration of lactoferrin from mastitic camels (3.8+or-0.67) was significantly higher than that in normal camels (2.65+or-0.88). The mean log concentrations of lactoferrin in 3- and 4-year-old lactating camels were significantly higher than that in older camels. A correlation was observed between the levels of lactoferrin in normal and mastitic camel milk and the SCC score. The log lactoferrin concentrations in subclinical mastitic camel milk infected with Staphylococcus aureus and coagulase-negative staphylococci isolates were significantly higher than those for other bacterial isolates. No differences in the concentration of lactoferrin were observed in

reference to the stage of lactation. These data could help in understanding the mechanisms of udder resistance to infections. In addition, levels of lactoferrin in milk could be used as a diagnostic tool in cases of subclinical mastitis.
Descriptors: dromedary camels, lactation, lactation stage, age differences, disease markers, lactoferrin, mastitis, milk composition, milk quality, somatic cell count, subclinical mastitis, coagulase negative staphylococci, *Staphylococcus aureus*.

Al Sultan, SI; Mohammed, AM **The effects of the number of lactations on the chemical composition of camel milk.** *Journal of Camel Practice and Research*. 2007; 14(1): 61-63. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The effect of the number of lactations on the chemical composition of camel milk was studied in 20 she-camels. They were divided into Groups A, B, C and D, each group consisting of 5 she-camels of similar age. Group A was in first, B in second, C in third and D was in the fourth lactation period. The parameter investigated included the pH, specific gravity (S.G.), total solids (T.S.), water content, protein, fat, lactose and minerals (Ca and P). It was shown that the number of lactations had no effect on pH, S.G., T.S. water content and protein, fat, lactose and minerals (Ca and P) of camel milk and the differences were not significant among the 4 groups for these parameters. Reproduced with permission of CAB.
Descriptors: dromedary camels, camel milk production, camel milk, number of lactations, lactose, milk, sugar, milk composition, milk fat percentage, milk protein percentage, milk quality, minerals, calcium, pH, phosphorus, specific gravity, total solids, water content.

Anomyous. **World dairy situation 2007.** *European Dairy Magazine.* 2007; (7): 10, 12. ISSN: 0936-6318
Abstract: This article presents the findings of the International Dairy Federation of the status of world milk production, processing and marketing of milk products in 2007.
Descriptors: buffaloes, camels, cattle, goats, sheep, dairy situation, livestock dairy animals, milk products and volumes, dry skim milk, yogurt, joghurt, cheeses, milk marketing, world markets, milk processing, milk production.

Farah, Z; Mollet, M; Younan, M; Dahir, R. **Camel dairy in Somalia: Limiting factors and development potential.** *Livestock Science.* 2007 June; 110(1-2): 187-191. ISSN: 1871-1413
DOI: http://dx.doi.org/10.1016/j.livsci.2006.12.010
NAL call no: SF1 .L5
Descriptors: camels, females dairy animals, camel milk, dairy herds, dairy herd management, surveys, milk analysis, milk composition, milk quality, dairy hygiene, fermented milk, Somalia.

Gorak (h?) Mal; Sena, DS. **Milk composition among different breeds of camel.** *Indian Veterinary Journal.* 2007; 84(10): 1064-1065. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Descriptors: camels, Bikaneri, Jaisalmeri, Kachchhi, lactating females, breed differences,

milk composition, comparison study, milk protein, casein, milk fat, pH, ash, total solids, solids not fat.

Hassaine, O; Zadi Karam, H; Karam, NE. **Technologically important properties of lactic acid bacteria isolated from raw milk of three breeds of Algerian dromedary (*Camelus dromedarius*).** *African Journal of Biotechnology*. 2007; 6(14): 1720-1727. ISSN: 1684-5315
Abstract: A total of 9 samples of individual dromedary raw milks from N'ajjer (3), Targui (3) and Reguibi (3) breeds were collected from 3 camels nomad herd in south Algeria and were analysed for bacterial load. A total of 23 strains of lactic acid bacteria were isolated, out of which 12 strains were cocci and 11 strains were facultatively heterofermentative lactobacilli. Lactic acid bacteria were identified on the basis of phenotypic characters as *Lactococcus lactis* subsp. *lactis*, *Enterococcus faecalis*, *Enterococcus faecium*, *Enterococcus durans*, *Lactobacillus paracasei* subsp. *paracasei*, *Lactobacillus plantarum* and *Lactobacillus rhamnosus*. Whole cells of lactococci, enterococci and lactobacilli showed proteolytic activity and were found to differed in terms of their acidifying activities. Proteolytic and autolytic activity were generally higher for most lactobacilli compared to other isolates and none of the strains produced biogenic amines in the method applied. A wide variety of this 23 lactic acid bacteria strains isolated from Algerian dromedary milks that showed potentially important properties suggest that they are good candidate for camels milk processing or other dairy fermentation process. Reproduced with permission of CAB.
Descriptors: dromedary camel, N'ajjer breed, Targui breed, Reguibi breed, breed differences, raw milk, bacterial load, *Lactococcus lactis* subsp. *lactis*, *Enterococcus faecalis*, *Enterococcus faecium*, *Enterococcus durans*, *Lactobacillus paracasei* subsp. *paracasei*, *Lactobacillus plantarum* and *Lactobacillus rhamnosus*, cultured milks, fermentation, lactic acid bacteria strains, Algeria.

Shamsia, SM. **Nutritional and therapeutic properties of camel and human milks.** *10 th Egyptian Conference for Dairy Science and Technology, Research Papers, Held at The International Agriculture Centre, Cairo, Egypt, 19 21 November, 2007.* 2007; 135-149. ISBN: 9789251058176.
Note: In English with an Arabic summary.
Abstract: Camel and human milk samples (twenty individual samples each) were analysed for fat, total protein (casein, whey protein), lactose, minerals as well as vitamins; B< sub>1</ sub>, B< sub>2</ sub>, niacin and C. Meanwhile, amino and fatty acid compositions and, antimicrobial factors namely; lysozyme (LZ), lactofenin (LF) and total immunoglobulins (Igs) were determined. Results indicated that camel milk contained higher fat, protein (especially casein), ash, Ca, Mg, P, K, Na, Fe, and Cu but lower in whey protein, lactose and Zn than human milk. Vitamins C and niacin were higher in camel milk than human milk. Camel milk proteins contained satisfactory balance of essential amino acids. The ratio of essential to non-essential amino acids were 0.93 and 1.07 in camel and human milk proteins, respectively. Camel milk was characterized by higher ratio of Igs but lower in both LZ and LF than human milk. General pattern of camel milk fatty acids indicated that short chain fatty acids (C< sub>4</ sub>-C< sub>12</ sub>) were present in very small amount, but higher than in human milk fat. On the contrary the concentration of C< sub>14:0</ sub>, C< sub>16:1</ sub> and C< sub>18:0</ sub> are relatively high in camel's milk fat as compared to human milk fat Appreciable amounts of essential fatty acids were present in camel milk. It can be concluded that camel milk can be considered as a good food of high nutritive

and therapeutic applications. Meanwhile, the high content of antimicrobial agents in camel milk may explain its potential as a antiviral activity specially against diarrhea-causing viruses. Reproduced with permission of CAB.

Descriptors: camels, humans, camel and human milk, milk composition, nutritional value, amino acids, ascorbic acid, mineral content, calcium, iron, magnesium, potassium, phosphorus, sodium, copper, casein, fatty acids, immunoglobulins, lactoferrin, lactose, lysozyme, milk fat, butter fat, nicotinic acid, nutritive value, protein content, riboflavin, thiamin, whey protein, aneurin, gamma globulins, immune globulins, milk sugar, niacin, thiamine, vitamin B1, vitamin B2, vitamin C.

Vimla Dukwal; Sheetal Modi; Mamta Singh. **A comparative study of nutritional composition of camel and cow's milk.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 198-199.

Abstract: A comparative study of nutritional composition of camel and cow's milk was done based on 10 samples of raw milk. Protein and carbohydrate content of camel milk were significantly higher as compared to cow's milk. Similarly the fat content of camel was found to be lower. The percentage of sodium was lower whereas potassium content was higher in camel milk. It was concluded that camel milk contained appreciable amount of protein, carbohydrate and potassium. Reproduced with permission of CAB.

Descriptors: dairy cows, camels, camel milk, cows' milk, comparison, carbohydrates, milk composition, milk proteins, milk quality, nutritive value, potassium, sodium, species differences.

Wernery U. **Camel milk - new observations.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 200-204.

Abstract: The camel is a multi-purpose animal with a huge productive potential. To western societies and even scientists it is unfortunately an alien animal. Only a few people have realised that the camel is the most suitable domestic animal for use in climatic extremes. In time of global warming, growing deserts and increasing scarcity of food and water, the camel can be part of a solution to these problems. Small-scale enterprises have demonstrated that living condition of the nomadic herdsman and his family can be improved by selling surplus camel milk. The Dubai example has also clearly proven that dromedaries can be milked in high-tech dairy farms. Some compositions of camel milk are different from cow milk and their values also differ from cow milk and also between different researchers. Insulin, vitamin C, niacin and some unsaturated fatty acids are higher in camel milk. The absence of beta-lactoglobulin and the different compositions of proteins in camel milk may prevent allergic reactions. Therefore, camel milk could be an interesting alternative for infant milk products. Although the amount of lactose in camel milk is as high as in cow milk, lactose intolerance against camel milk does not exist. The reason is unknown. Raw camel milk is highly contaminated with bacteria when camels are milked under nomadic conditions lacking proper hygiene. However, there is no doubt that microbiological parameters of camel milk can meet international standards of cow milk when proper hygienic conditions are in place. No microbiological standards for camel milk exist. Camel milk must be heat-inactivated for human

consumption. Our investigations showed that the shelf life of pasteurised camel milk kept at 4 degrees C is more than 10 days. Heat-inactivation of 72 degrees C for 5 minutes on different camel milk parameters, including insulin and vitamin C reduces their amount by only 5% to 8%. Gammaglutamyl transferase (GGT) is a potential indicator for the question of whether camel milk has been properly pasteurised or not. Reproduced with permission of CAB.

Descriptors: camel, camel milk, ascorbic acid, gamma-glutamyltransferase, heat treatment, inactivation, insulin, lactose, raw milk, milk composition, milk hygiene, milk processing, milk production, milk quality, nicotinic acid, niacin, vitamin C, food safety, pasteurization, heat treatment, pasteurized milk, quality controls, unsaturated fatty acids, quality assurance, Dubai.

Wernery, U; Johnson, B; George, RM. **Gamma-glutamyl transferase (GGT), a potential marker for the evaluation of heat treatment of dromedary milk.** *Journal of Camel Practice and Research.* 2007; 14(1): 9. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Two-hundred dromedary milk samples from Dubai, United Arab Emirates were subjected to heat inactivation treatment (raw and at 72 degrees C for 15 and 30 seconds and 10 and 20 min), after which the activities of gamma -glutamyltransferase (GGT) and alkaline phosphatase (ALP) were determined. It was shown that although GGT was present at high levels in raw milk, it was gradually destroyed at increasing heating times and was completely undetectable at 10 and 20 min. ALP was present at lower levels compared to GGT, and was not completely destroyed in 20 min. In conclusion, GGT can be a potential marker for the evaluation of proper heat treatment of camel milk, while ALP cannot be used for this purpose.

Descriptors: dromedary camels, camel milk, raw milk, food safety, heat treatment; milk hygiene; milk processing, pasteurization, sterilization, inactivation of enzymes, glutamyl transferase alkaline phosphatase, alkaline phosphomonoesterase, Trucial states, United Arab Emirates.

Yohannes Mehari; Zeleke Mekuriaw; Getachew Gebru. **Camel and camel product marketing in Babilie and Kebribeyah woredas of the Jijiga Zone, Somali Region, Ethiopia.** *Livestock Research for Rural Development.* 2007; 19(4): 19049. ISSN: 0121-3784

Abstract: The study was conducted from July 2005 to January 2006. The objective of this study was to examine the existing marketing situation of camel and camel products in the study areas, Babilie and Kebribeyah woredas, Jijiga Zone of the Somali Regional State. The method of data collection employed was a single visit formal survey. The data were analyzed using Statistical Package for Social Sciences (SPSS) version 12. The traditional markets are used for the sale of animals for slaughter, and for the sale of male camels for pack use. The mean numbers of camels sold per household during the year 2004/05 were 1.48 and 1.27 for Babilie and Kebribeyah, respectively, while, the mean numbers of camels bought were 2.40 and 3.14 in the same order. The mean age of camels sold during the year 2004/05 was 79.90 and 84.80 months for Babilie and Kebribeyah, respectively. In the same year, the mean age of camels bought was 29.20 and 24.00 months for Babilie and Kebribeyah, respectively. The average selling price of camels during the survey year was 2011.36 and 1784.38 birr for

Babilie and Kebribeyah, respectively. In the same year, the average price of bought camels was 1690.00 and 671.00 birr for Babilie and Kebribeyah, respectively. Respondents (35 and 3.3% in Babilie and Kebribeyah, respectively), reported that camel selling time was during festivals. The main reason for selling camels was family cash need to purchase their basic needs. In the study areas, there is a customary of selling larger sized, old and unproductive camels. According to Ethiopian Customs Authority, 726 live camels were exported to Jordan in 2005 only. Most farmers in Babilie sell camel milk either at Bombas or Babilie town. For Kebribeyah pastoralists, Kebribeyah and Hartisheik towns, and open-air collection centers are camel milk selling places. There was a significant difference ($p<0.01$) in the volume of camel milk sold in both seasons between Babilie and Kebribeyah woredas. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel products, camel meat, camel milk, domestic markets, marketing, milk-marketing; selling prices, Abyssinia, Ethiopia.

Zeleke, ZM **Non-genetic factors affecting milk yield and milk composition of traditionally managed camels (*Camelus dromedarius*) in Eastern Ethiopia.** *Livestock Research for Rural Development.* 2007; 19(6): 85. ISSN: 0121-3784

Abstract: The study was conducted to asses the effects of non-genetic factors on milk yield and milk composition of camels kept under traditional management conditions in eastern arid and semiarid areas of Ethiopia. The overall mean daily yield and composition of fat, protein, lactose and dry matter of milk were 3.75 litres, 2.47%, 2.67%, 4.67% and 10.44%, respectively. Stage of lactation, parity and season of the year had significant ($P<0.01$) effects on daily milk yield, composition of fat, protein and dry matter. The percentage composition of lactose remained unaffected by all variables considered. The highest average daily milk yield was recorded during the first 3 months of lactation (4.04+or-0.10 litres), whereas the least was after 9 months of lactation. There was no significant difference in daily milk yield until 9 months postpartum. The percentage compositions of fat and protein were also the highest during the first 3 months of lactation period (3.24+or-0.11 and 2.98+or-0.06, respectively). Similarly, the highest average daily milk yield and percentage composition of protein, fat and dry matter were recorded from camels of 3rd parity (5.43+or-0.19 litres, 5.32+or-0.44, 3.16+or-0.26 and 13.33+or-0.63, respectively). The least milk yield was obtained from camels of parity six. The highest daily milk yield (4.21+or-0.11 litres) was recorded during the wet season as compared to the dry season (3.54+or-0.10 litres). This study indicated that camels are reliable sources of milk in hostile regions of the country with persistent yield and composition throughout most periods of lactation. However, culling strategy of old dams (after parity five in this case) and provision of adequate feed and water during dry season would result in better productivity. Reproduced with permission of CAB.

Descriptors: dromedary camel milk, milk yields, milk composition, lactation stage; lactose levels, milk fat percentage, milk production, milk protein percentage, milk quality, parity, seasonal variations, wet season, dry matter, dry season, environmental factors, rainy season, Ethiopia, Abyssinia.

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Abdurahman, OAS. **Udder health and milk quality among camels in the Errer valley of eastern Ethiopia.** *Livestock Research for Rural Development.* 2006; 18(8): 110. ISSN: 0121-3784

Abstract: Quarter milk samples (n=205) from 53 camels were examined to study the occurrence and causes of mastitis in traditionally managed camels in the Errer valley of eastern Ethiopia and to observe factors affecting udder health. The study revealed tick infestation and lesions on the teats and udder skin 26 (49,1%). Seven (3.3%) camels had blind teats and 5(9.4%) had clinical mastitis. Seventy-seven (37.6%) quarters yielded bacteria. *Staphylococcus aureus*, *Streptococcus agalactiae* and coagulase negative staphylococci were the main organisms isolated. A high proportion (80%) of bacteria positive milk samples had CMT score 2 or more, while a similar proportion (80%) of bacteriologically negative samples showed CMT score 1. Quarters infected with bacteria had significantly higher mean values for somatic cell counts than non-Infected ones log 12.5 and 13.6 respectively. The demographic parameters of age, parity, and lactation stage did not influence the ability to predict whether a quarter was normal, when judged on percentage correctly classified. The significance of the findings in relation to production system, hygiene and public health aspects were discussed. It is concluded that early problem recognition and improved hygienic measures will result in reduced losses due to mastitis and increase the availability of milk for consumption and sale.

Descriptors: dromedary camels, camel milk, mastitis, disease prevalence, disease surveys, California mastitis test, epidemiological surveys, epidemiology, microbial contamination of milk, milk hygiene, milk quality, somatic cell count, *Staphylococcus aureus*, *Streptococcus agalactiae,* Abyssinia, Ethiopia.

Gorakh Mal; Sena, DS; Sahani, MS. **Milk production potential and keeping quality of camel milk.** *Journal of Camel Practice and Research.* 2006; 13(2): 175-178. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: Daily milk production in 5 lactating camels each of Bikaneri, Jaisalmeri and Kachchhi breeds belonging to first, second and third parity was studied. Milk yield was recorded daily at 12-h intervals by 2 different milking techniques, viz. 4-teat stripping and 2-teat stripping of one side and allowing the calf to suckle the other 2 teats. The average daily milk production by 4-teat and 2-teat stripping were 2.80+or-0.17 and 3.98+or-0.32 litres/day in Bikaneri, 2.60+or-0.17 and 3.90+or-0.34 litres/day in Jaisalmeri and 3.04+or-0.17 and 4.12+or-0.35 litres/day in Kachchhi, respectively. The effect of breed was significant ($P<0.05$) for total milk production in 4-teat stripping. The effect of parity was also significant ($P<0.01$) for total production under both the milking techniques. The month-wise daily milk production under both the techniques indicated significant ($P<0.01$) variation. Keeping quality was studied in 50 fresh camel milk samples comprising of pure and milk diluted with water (1:1) kept at room temperature (29+or-3 degrees C); pure and diluted (1:1) milk stored at 4 degrees C. The parameters studied at 2 h intervals were acidity, clot on boiling (COB) test, alcohol test, alizarin-alcohol test and pH. The study indicated that pure and diluted (1:1) milk at room temperature could be stored for 8 and 10 h, respectively, while pure and diluted (1:1) milk at 4 degrees C can be stored for 20 and 28 days, respectively.

Descriptors: dromedary camels, breed differences, camel milk, keeping quality, milk production, milk quality, milk yield, milking, storage, storage life, temperature.

Kadim, IT; Mahgoub, O; Al Marzooqi, W; Al Zadjali, S; Annamalai, K; Mansour, MH. **Effects of age on composition and quality of muscle longissimus thoracis of the Omani Arabian camel (*Camelus dromedaries*).** *Meat Science.* 2006 Aug; 73(4): 619-625. ISSN: 0309-1740
DOI: http://dx.doi.org/10.1016/j.meatsci.2006.03.002
NAL call no: TX373.M4
Abstract: The aim of this study was to determine the effects of age on chemical composition and quality characteristics of the Arabian one-humped camel's meat. Samples of longissimus thoracis (between the 10th and the 13th rib of the left side) were randomly collected from 21 Omani intact male camels of three different age groups: group 1 (1-3 years), group 2 (3-5 years) and group 3 (6-8 years). Samples were chilled (1-3AC) for 48 h. Moisture, crude protein, fat and ash were determined on freeze dried ground muscle. Mineral contents were determined using an Inductively coupled plasma emission spectrometer (ICP). Meat quality including ultimate muscle pH, Warner-Bratzler shear force, sarcomere length, myofibrillar fragmentation index, expressed juice, cooking loss percent, and colour L, a, b were measured using standard methods. The moisture, protein, fat and ash ranged from 64.4% to 76.7%; 18.6% to 25.0%, 1.1% to 10.5% and 1.0% to 1.4% on dry matter basis, respectively. The Ca, Mg, Na, K, P, Cad, Cr, Ni, Pb, Co, Mo, Be and V ranged from, 9.2 to 46.6, 24.7 to 57.3, 104.7 to 257.0, 471.4 to 1053.0, 249.9 to 584.0, 0.005 to 0.024, 0.020 to 0.410, 0.016 to 0.187, 0.010 to 0.299, 0.010 to 0.018, 0.050 to 0.470, 0.005 to 0.030 and 0.013 to 0.141 mg/100 g on dry matter basis, respectively. The percentage of protein decreased and that of fat increased with increasing camel age. The ultimate pH, shear force, sarcomere length, fragmentation index, expressed juice, cooking loss, lightness (L), redness (a) and yellowness (b) ranged from 5.46 to 6.64, 4.25 to 17.82, 0.96 to 2.50, 55.91 to 94.81,19.50 to 33.63, 13.18 to 29.88, 27.86 to 43.21, 10.46 to 22.81, and 4.63 to 10.11, respectively. Muscles of younger camels (group 1) had significantly ($P < 0.05$) lower shear force value, ultimate pH and higher sarcomere length, fragmentation index, expressed juice, cooking loss, and lightness color (L) by 48%, 3.4%, 43%, 25%, 28%, 14%, and 16% than those collected from older camels (group 3), respectively. Values of middle age camels (group 2) camels were in-between. This study confirmed that camel meat is healthy and nutritious as it contains low fat as well as being a good source of minerals. Age is an important factor in determining meat quality and composition. Reproduced with permission of CAB.
Descriptors: dromedary camels, males, age at slaughter, camel meat, longissimus dorsi, freeze drying, meat composition, moisture content, crude protein, lipid content, ash content, meat quality, meat tenderness, texture, shear strength, sarcomeres, cooking quality, pH, color, mineral content, dietary minerals, cooking loss.

Kamili, A; Bengoumi, M; Faye, B. **Assessment of body condition and body composition in camel by barymetric measurements.** *Journal of Camel Practice and Research.* 2006; 13(1): 67-72. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: This study was conducted to assess the liveweight, carcass weight and importance of fat storage in camel by barymetric measurement before and after slaughter. A total of 61 camels aged between 6 months and 15 years were measured at the abattoir of Dakhla in south of Morocco. The barymetric measures were achieved before slaughter. After the death of the animals, the hump volume was estimated using the Archimedes' principle. The

hump length and height were good indicators of the carcass weight (r=0.73 and r=0.78, respectively) and liveweight (r=0.54 and r=0.53, respectively). Neck perimeter and thigh perimeter were good predictors of the carcass weight. The liveweight and carcass weight could be assessed by the following equations: (i) carcass weight (kg)=1.21 x (hump height (cm) + neck perimeter (cm) - 17.49); (ii) liveweight (kg)=4.06 x age (year) + 3.05 x neck perimeter (cm) + 3.38 x thigh perimeter (cm) + 1.38 x hump length (cm) - 191; with 86 and 94% of the explained variance, respectively. Hump volume, length and height of the hump were good indicators of the adiposity of the camel (correlation coefficients of 0.80, 0.70 and 0.60, respectively) with the total fat storage. The hump represented 80% of the fat stored, whereas the fat around the kidney and mesentery represented 15 and 5%, respectively. The multivariate analysis allowed the identification of 3 types of body condition (live measures) and body composition (postmortem measures). Reproduced with permission of CAB.
Descriptors: dromedary camels, body composition, body condition, body fat, carcass weight, kidneys, liveweight, mesentery, morphometrics, neck.

Karam, Halima Zadi; Karam, NE. **Bacteries lactiques du lait de chamelle d'Algerie: mise en evidence de souches de *Lactococcus* resistantes au sel. [Lactic acid bacteria of camel milk: Presence of salt resistant strains of *Lactococcus*.]** *Tropicultura.* 2006; 24(3): 153-156. ISSN: 0771-3312. Note: In French.
Descriptors: camels, raw camel milk, lactic acid bacterial strains, *Lactococcus*, *Leuconostoc*, *Lactobacillus*, 6.5% salt resistant coccal isolates, *Lactococcus lactis* ssp *lactis* (1.2%), *Lactococcus lactis* ssp. *cremoris* (4.9%), *Lactococcus lactis* ssp. *diacetylactis* (28.4%), enterococcal strains (34.6%), *Enterococcus feacalis* sp, *Leuconostoc lactis* (7.4%) or *Leuconostoc dextranicum* (4.9%), *Lactobacillus plantarum* (18.5%).

Karray, Nadia Laadhar; Danthine, Sabine; Blecker, Christophe; Attia, Hamadi. **Contribution to the study of camel milk fat globule membrane**. *International Journal of Food Sciences and Nutrition.* 2006; 57(5-6): 382-390. ISSN: 0963-7486
Descriptors: camels, camel milk, fat globule membrane characterization, physiochemical composition, protein content, neutral lipids, phospholipids, mechanical properties, film balance, air-water interface, thermal study, high-melting triacylglycerols, long chain containing fatty acids.

Levieux, D; Levieux, A; El Hatmi, H; Rigaudiere, JP. **Immunochemical quantification of heat denaturation of camel (*Camelus dromedarius*) whey proteins**. *Journal of Dairy Research*. 2006 Feb; 73(1): 1-9. ISSN: 0022-0299
URL: http://jds.fass.org/
NAL call no: 44.8 J823
Abstract: The major whey proteins IgG, serum albumin and alpha-lactalbumin were purified from camel milk using gel permeation and ion-exchange chromatography. Specific antisera against each of them were raised and used to quantify their heat denaturation in early or mature milk over a range of 60-90 degrees C for 10-60 min using the single radial immunodiffusion technique. The heat denaturation midpoints for the mature milk heated 30 min were 67.2, 73.0 and 77.5 degrees C for IgG, albumin and alpha-lactalbumin respectively. The early milk was more sensitive to heat treatment with coagulation at low temperature and heat

denaturation midpoints of 64.8, 71.6 and 72.6 degrees C respectively. This difference was related to the high IgG content of the early milk (12.6 mg/ml v. 0.5 mg/ml for the mature milk) and stresses the importance of monitoring the IgG level of milk to assess the absence of colostrum.

Descriptors: dromedary camels,camel milk, food preservation, heat treatment, denaturation, whey protein, immunochemistry, immunoglobulin G, serum albumin, lactalbumin, analytical methods, immunodiffusion tests, quantitative analysis, colostrum, milk quality, process monitoring, immunity.

Vaisman, N; Reuven, Y; Uzi, M; Georgi, G; Boehm, G. **Camel's milk and gastric emptying.** *Clinical Nutrition*. 2006; 25(4): 622-625. ISSN: 0261-5614

Abstract: Background & aim: Gastric emptying is determined by food consistency, pH, osmolality, lipid and calorie content as well as the presence of different nutrients in the duodenal lumen. Control of gastric emptying is essential for ensuring optimal digestion. The present study tested the hypothesis that due to its different precipitation properties, gastric emptying of camel's milk may be quicker than that of bovine's milk with the same caloric and fat content. Methods: Gastric emptying was studied by a scintigraphic technique in a randomized, double blind fashion in 8 volunteers after drinking 450 mL of either cow's milk or camel's milk. Results: No differences in gastric emptying rates were found between the two types of milk. The percentage of retention of the meal after 60 min was 74.6+or-13.2% for cow's milk and 79.8+or-10.8% for camel's milk. The 50% emptying time (T< sub>1/2</ sub>) was 131.8+or-37.4 min for cow's milk and 136.8+or-55.8 min for camel's milk. Conclusions: Camel's milk is most probably not a useful substitute for other types of milk to shorten gastric emptying. Reproduced with permission of CAB.

Descriptors: camels, humans, camel milk, milk fat, butterfat, calories, pH, randomized controlled trials, effect of each milk on human stomach emptying and motility.

Wernery, U. **Camel milk, the white gold of the desert.** *Journal of Camel Practice and Research.* 2006; 13(1): 15-26. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: New World camelids are not milked, but the milk of Old World camelids is being used for many centuries. The two-humped camel lives in cold climate, hence their milk fat can reach levels of 8% which serves as an energy source for the newborn. The one-humped camel lives in hot climatic zones, hence the fat content is low, but the water content is high. The camel udder possesses 4 quarters, one teat per quarter and 2 teat canals per teat, sometimes even 3. One of the most remarkable features of dehydrated camels is the ability to continue lactation and to secrete milk that is highly diluted with over 90% water content. A temperamental camel cow which does not like or know its milker will simply cease production, but a contented camel can produce milk for a very long period. Globally, the milk productivity of camels is more than 5 times lower than the milk productivity of cattle. The camel's mammary gland possesses at least 8 (4x2) independent milk units. The camels are milked by hand. A pilot camel milking project using bucket milking machines began at CVRL in 2001. A modern camel dairy farm with the intention of milking several hundred dromedaries will be opened in autumn 2006 in Dubai under the name Dubai Camel Dairy Farm (DCDF). Mastitis in camels is rare. Treatment of camel mastitis is carried out paren-

teral due to the narrow teat canals. No bacteriological standards exist for raw and pasteurized camel milk. Transformation from colostrum to normal milk is reached after 7-10 days. The colostrum of camels is white like normal milk. Duration of milk letdown is very short, about one to two min, therefore milking from both sides is essential. Camels should be milked several times a day. Good milkers can produce 20-30 litres daily. Camel milk is a rich source of proteins with potential antimicrobial and protective activity. Components of camel milk differ considerably from those of ruminants and have strong similarities to those of human. Camel fat contains a higher concentration of long chain fatty acids (C14-C18) than short chain fatty acids, and is therefore healthier. Camel milk contains less vitamin A, B< sub>2</ sub> folic acid and pantothenic acid than cow milk. On the contrary, the content of niacin and vitamin C is remarkably higher than in cow milk. The high concentration of vitamin C and the high water content are the most eminent factors of camel milk. Whey proteins in camel milk are more heat resistant than those of cow milk. The degree of denaturation varies in camel milk from 32 to 35% at 80 degrees C. In cow milk, 70-75% of whey proteins are denatured at this temperature. Pasteurization at 72 degrees C for 5 min reveals only 5-8% losses of camel milk composition investigated. Lactation periods of up to 24 months are known to occur in dromedaries. Camel milk proteins are different to that of cow milk. This may be the reason why no allergies to camel milk proteins are known. Camel milk does not coagulate easily. It passes the acidic stomach undisturbed and reaches the intestines for absorption. Camel milk contains 5 times more vitamin C compared to cow milk. Camel milk contains insulin and is therefore used to treat diabetes mellitus. Camel milk contains medicinal properties to treat different ailments such as autoimmune diseases, allergies, asthma, rash, diabetes, infectious diseases like tuberculosis, stress, peptic ulcers and cancer. It is a booster of the immune system. Camel milk products are consumed commercially as fresh, raw or pasteurized milk and cheese, especially soft cheese in West Africa (caravane made in Mauritania), ice creams with different flavours, milk shakes, puddings (creme brulee and panna cotta), Arabian dish mohabila and susa (North-Eastern Africa) or shubat (Kazakhstan) as sour milks. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, lactating camels, milking, camel milk, milk composition, colostrum, medicinal properties, milk products, milk proteins, milk quality, antibacterial properties, fat, fatty acids, immunoglobulins, gamma gabulins, lactoferrin, lactoperoxidase, lysozyme, N acetyl beta glucosaminidase, nicotinic acid, vitamins, whey protein, bactericidal properties, pasteurization, denaturation, heat treatment, mammary glands, mastitis, *Arcanobacterium pyogenes,Escherichia coli*, *Pasteurella multocida*, *Staphylococcus aureus*, *Streptococcus agalactiae*.

2005

Aly, SA. **Hygienic quality of Egyptian camel milk.** *Journal of Camel Practice and Research.* 2005; 12(2): 135-140. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Fifty raw Egyptian camel milk samples were randomly collected under sterile conditions from different dromedary camel herds at El-wahat El-baharia, Giza Governorate, Egypt [date not given]. 30% of the examined samples were positive for aerobic sporeform-

ers, 24% were positive for coliforms and 20% were positive for enterococci. *Pseudomonas*, *Aeromonas* spp. and coagulase positive *Staphylococcus aureus* were isolated. *Salmonella*, *Listeria* and *Yersinia* species could not be isolated. Many fungal species were isolated, including *Aspergillus*, *Penicillium,Alternaria*, *Acremonium* and *Chrysosporium* species. The lipolytic activity and aflatoxin production of the isolated moulds were examined. Among 90 fungal stains tested, 70 were positive for lipolytic activity with varying degrees, while none of the screened *Aspergillus flavus* and *Aspergillus parasiticus* strains were aflatoxin B1, B2, G1 and G2 producers. The economical and public health importance of the isolated microorganisms as well as control measures for improving the milk quality are discussed. Reproduced with permission of CAB.

Descriptors: dromedary camels, raw milk sampling, camel milk coliform bacteria, food contamination, microbial contamination, aflatoxins, bacterial count, milk hygiene, milk quality, mycotoxins, poisoning, sporeforming bacteria, toxicity, *Acremonium*, *Aeromonas*, *Alternaria*, *Aspergillus*, *Aspergillus flavipes*, *Aspergillus parasiticus*, *Chrysosporium*, *Enterococcus*.

Annageldiyev, O; Saparov, G; Atayeva, M. **Wool productivity and quality of fleece in the camel Arvana breed.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 221-223. ISBN: 1586034731

Descriptors: dromedary camels, Arvana camel breed, fiber/wool producing camels, age differences; fiber color, fleece, wool production, fleece qualities, Central Asia.

Baars, RMT; Kebebew, T. **Milk production performance of pastorally managed camels in eastern Ethiopia.** *Tropical Agriculture*. 2005; 82(3): 197-203. ISSN: 0041-3216

NAL call no: 26 T754

Abstract: Milk production of 30 lactating camels belonging to 1 herd of 100 heads was monitored during 19 months from March 1996 to September 1997 in eastern Ethiopia. The effects of season of calving, parity, and calf survival up to weaning on mean daily yield, peak yield, total lactation yield, lactation length, days open, and calving interval were assessed. The least square means (+or-standard deviation) of the daily, peak, and lactation yield were 7.5+or-0.5, 11.5+or-0.5, and 2104+or-97 L, respectively. The least square means of lactation length, days open, and calving interval were 282+or-10, 199+or-13, and 573+or-14 days, respectively. All parameters were significantly ($P<0.05$) affected by the season of calving. The maximum lactation yield was observed for camels in the third and fourth lactations. The lactation curves had a typical shape, although less pronounced for camels that calved during the long dry season. Camels that calved in the long wet season and older camels showed a lower persistency. Camels whose calves died before weaning showed a significantly higher yield than camels whose calves stayed alive. The fat, protein, casein, total solids, and solids non-fat were 39+or-4, 29+or-3, 23+or-2, 131+or-6, and 92+or-6 g kg-1, respectively. They were all significantly affected by parity and month of lactation. It was concluded that during the dry season, the herd produced a substantial amount of milk for the pastoralists. Reproduced with permission of CAB.

Descriptions: dromedaries, camel milk, casein, lactation curve, lactation duration, milk composition, milk fat, milk production, milk protein, milk yield, parturition, parturition interval, performance, seasonal variation, seasonality, seasons, solids not fat, survival, total

solids, butterfat, milk constituents, seasonal changes, seasonal fluctuations, Ethiopia, Abyssinia.

Chen, Y; Wu, YJ; Xu, BL; Wan, J; Qian, ZM. **Species-specific polymerase chain reaction amplification of camel (*Camelus*) DNA extracts.** *Journal of AOAC International*. 2005 Sept-Oct; 88(5): 1394-1398. ISSN: 1060-3271

Abstract: A sensitive polymerase chain reaction (PCR) method based on amplification of a specific DNA fragment was established for the identification of camel (*Camelus*) materials. The species-specific primer pair L183/H372 was designed based on the nucleotide sequence of the mitochondrial cytochrome b gene, and its specificity was confirmed by amplification of 3 camel (domestic double-humped camel, wild double-humped camel, wild one-humped camel) samples and 11 non-*Camelus* animal (sheep, goat, pig, chicken, cattle, fish, dog, horse, donkey, deer, and rabbit) materials. An expected 208 base pair fragment was amplified from camel materials; no cross-reactive or additional fragments were generated from other animal materials. Taq I restriction endonuclease digestion of the unpurified PCR product can be used routinely to confirm the camel origin of the amplified sequence.

Descriptors: *Camelus* , wild dromedary camels, domesticated Bactrian camels, wild Bactrian camels, camel meat, product authenticity, DNA, polymerase chain reaction, PCR, nucleotide sequences, cytochrome B, meat and bone meal, molecular sequence data.

Cherzekov, A; Saparov, G. **The milk productivity of the camel Arvana breed and its use.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 215-220. ISBN: 1586034731

Abstract: In Turkmenistan, the Arvana camel has been selected for different purposes, especially for milk production. Some lines of camels were selected in the state farm. Its milk productivity can be high and can reach more than 2500 kg of milk in one lactation. The milk production is higher in spring. Camel milk has medical and nutritional properties. Camel milk processing into local traditional products is widely done in the country. Reproduced with permission of CAB.

Descriptors: dromedary camels, Arvana breed, breed uses, selection for breeding, lactation duration, milk composition, milk production, camel milk products, camel milk yields, seasonality, Turkmenistan, Central Asia.

Dereje, M; Uden, P. **The browsing dromedary camel. II. Effect of protein and energy supplementation on milk yield.** *Animal Feed Science and Technology*. 2005 June 24; 121(3-4): 309-317. ISSN: 0377-8401

Descriptors: dromedary camels, browsing, feed supplements, protein supplements, dietary energy sources, lactation, milk yield, camel milk, livestock feeding, feed concentrates, protein concentrates, corn meal, *Arachis hypogaea*, dry season, wet season, seasonal variation, milk fat, milk protein percentage, crude protein, plant byproducts, grazing, nutritive value, Ethiopia.

Farah, Z; Younan, M. **Camel dairy in Eastern Africa: present state and future perspectives.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005;

173-180. ISBN: 1586034731

Abstract: There are about 17 million camels in the world. Of these, 13 million are found in Africa and 4 million in Asia. Of this estimated world population, 15 million are believed to be one-humped dromedary camels (*Camelus dromedarius*) and 2 million are two-humped (*Camelus bactrianus*). Approximately 11 million dromedaries, representing two-thirds of the world's camel population, are in the arid areas of Africa, particularly in Northeast Africa. In many arid areas, camels play a central role as milk suppliers. In absolute terms, the camel produces more milk and for a longer period of time than other species maintained in the same environment. Milk yields per day vary from 3.5 kg for animals under desert conditions up to 18 kg for animals in irrigated land. In the context of advancing urbanization, camel milk is increasingly commercialized in the informal market in urban areas. Besides being fresh, camel milk is often sold and consumed in the form of fermented milk. The milk is of poor hygienic quality due to the use of unclean containers, long transport and high ambient temperatures. This results in a potentially high health risk to the public through spread of zoonotic infections and food poisoning agents. Due to increasing camel milk consumption in urban and pre-urban areas, there is a growing interest in the introduction of appropriate conservation and storage methods to improve the hygienic safety and shelf life of the commercialized milk. This paper discusses the present limiting factors for building modern camel dairies and possible options for improvement. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel dairies, milk production, milk yield, improving hygienic quality of camel milk products and marketing, camel milk composition, camel butter, casein, cheeses, fermented milk products, commercialization, cultured milks, milk contamination, heat treatment, lactoperoxidase, milk composition, whey protein, East Africa.

Faye, B; Esenov, P. ***Desertification Combat andFood Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.*** IOS Press, Amsterdam. 2005; 225 pp

Abstract : This book gives an overview of the status of camel production, development of camel products and maintenance of animal productivity in order to satisfy human requirements both in quantity and quality. The workshop contributes to the exchange between scientists in order to allow access to new approaches and methodologies by all desert and camel scientists in the involved countries (Western European countries, Mediterranean countries and Central Asian Republics). The 4 papers presented in the plenary sessions discuss the new trends in camel sciences, desertification in Central Asian countries, Arvana breed camel and the association between camel and society. A total of 14 papers give emphasis on desertification, selection, breeding and diseases of camels. Camel keeping and productiveness are discussed in 16 papers. Moreover, recommendations are given. Reproduced with permission of CAB.

Descriptors: desertification, desert animals, domestication, dromedary camels, Bactrian camels, camel production, pasteurizing, grazing behaviors, reproductive performance, selective camel breeding, camel genetic resources, camel-based products, camel milk production, camel milk composition, camel milk products, sour milk, lactoferrin, leptin, lipids, fiber products, fleece, wool, adipocytes, disease prevention, infectious-diseases, mycoses, probiotics, therapy,

Faye, B. **Productivity potential of camels.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 127-134. ISBN: 1586034731

Abstract: It is accepted that camel has the ability to produce more milk than cow in similar conditions. However, the camel milk productivity is not well known. Data from the literature are scarce and mainly from observations in research stations. Data are more rarely from pastoral areas, where performance monitoring is uncommon. Elsewhere, the data are not homogeneous from one author to another with regards to mean daily yield, total yield per lactation and herd average. Therefore, the comparisons are not easy. Furthermore, there is a high variability of reported productions, which leads to suppose a potential for the selection on that criterion. This selection is possible but rarely achieved except in Soviet Union for dromedary and Bactrian camels. The world production of camel milk is officially estimated to be 1.3 million tonnes in 2002. However, according to the high level of self-consumption and of the individual potential, this production can probably be higher (i.e. 5.4 millions tonnes). The individual production varies between 1000 and 12000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is quite variable (from 8 to 18 months in general), but longer than that for dairy cattle in similar conditions. The feeding and seasonal conditions have an impact on performance. Some intensified systems occurring in many places showed good prospects in camel milk production to supply populations from arid lands.

Descriptors: dromedary camels, Bactrian camels, camel milk, dairy performance, lactation curve, lactation duration, milk consumption, milk production, milk supply, milk yield, seasonality, selection, genetic variation, genotypic variability, Africa, Asia.

Karray, N; Lopez, C; Ollivon, M; Attia, H. **La matiere grasse du lait de dromadaire: composition, microstructure et polymorphisme. Une revue.[Dromedary milk fat: composition, microstructutre and polymorphism. A review.]** *OCL Oleagineux, Corps Gras, Lipides.* 2005; 12(5/6): 439-446. ISSN: 1258-8210. Note: In French with an English summary. A review of the literature.

Descriptors: dromedary camel, composition of camel milk fat, butterfat, fatty acids, triacylglycerols, microstructure, fat globules size distribution, polymorphism, thermal and structural properties.

Khaskheli, M; Arain, MA; Chaudhry, S; Soomro, AH; Qureshi, TA. **Physico-chemical quality of camel milk.** *Journal of Agriculture and Social Sciences.* 2005; 1(2): 164-166. ISSN: 1813-2235

Abstract: The present study was carried out to investigate the quality of camel milk in Hyderabad, Pakistan. A wide variation was observed in the quality of raw camel milk. Specific gravity ranged between 1.014-1.017 (1.015+or-0.001), pH 6.57-6.97 (6.77+or-0.07) and acidity was 0.12-2.00 (0.18+or-0.01 g per 100 g). Total solids (TS), solids not fat (SNF), fat, protein, casein, lactose, ash and chlorides contents ranged between 7.76-12.13, 5.56-8.29, 1.8-5.0, 1.8-3.2, 0.78-2.76, 2.9-4.12, 0.85-1.00 and 0.20-0.28 g per 100 g, respectively. The mean values (g per 100 g) were 9.74+or-0.49 for TS, 7.12+or-0.35 for SNF, 2.63+or-0.40 for fat, 2.54+or-0.19 for protein, 2.21+or-0.02 for casein, 3.65+or-0.16 for lactose, 0.94+or-0.02 for ash and 0.26+or-0.01 for chlorides.

Descriptors: dromedary camels, raw camel milk, acidity, ash, casein, chlorides, lactose, milk composition, milk fat percentage, milk protein percentage, milk quality, pH, physicochemical properties, solids not fat, specific gravity, total solids, Pakistan.

Konuspayeva, G; Serikbayeva, A; Loiseau, G; Narmuratova, M; Faye, B. **Lactoferrin of camel milk of Kazakhstan.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 158-167. ISBN: 1586034731

Abstract: Lactoferrin is an iron-containing protein with a molecular mass of 76-80 kDa with 689 amino acids residues and 2 Fe3+ binding centres. This relatively recently known protein has a number of properties. It has antibacterial, antiviral, antifungal, anticarcinogenic, antiinflammatory, antioxidant and analgesic properties. Lactoferrin raises the immune response of the organism and is involved in Parkinson's and Alzheimer's diseases. Lactoferrin is present in all excretory secretions of mammals such as tears, saliva, blood, urea, nasal and uterus cavity, sperm and amniotic and also in the neutrophil of leukocytes. Mostly, lactoferrin is present in milk and colostrum. A comparative survey of lactoferrin concentration in different milks showed that the biggest content is in camel milk. Camel milk has 30-100 times higher concentration of lactoferrin than bovine milk. After heat treatment at 85 degrees C, camel milk still contains 37% of lactoferrin, whereas bovine milk only contains 1.2%. Bovine and camel lactoferrin are homologous in affinity, being 74.9%. Amino acid compound studies showed that camel lactoferrin is rich with Met, whereas bovine lactoferrin is rich with Val. Camel milk is a traditional food product in Kazakhstan and accounted to be a health-promoting product that helps in healing and preventing many diseases. However, these properties of camel milk are still unproven by scientists. It is believed that lactoferrin is remarkably responsible for such properties of camel milk. Lactoferrin is also used as a preserving agent in food, medicines and cosmetics. Technologies of industrial purification are now developing. The number of use targets is rapidly growing. For example, lactoferrin can be used in diagnostics of inflammation processes. Reproduction with permission of CAB.

Descriptors: dromedary camels, camel milk, milk composition, antibacterial properties, anticarcinogenic properties, antifungal properties, anti-inflammatory agents, antiviral properties, immunity, iron binding capacity, lactoferrin, analgesics, Kazakhstan.

Matofari, JW; Younan, M; Nanua, JN; Mwatha, EW; Okemo, PO. **Microorganisms associated with sub-clinical mastitis and their impact on milk production in camels (*Camelus dromedarius*) in semi-arid lands of Northern Kenya.** *International Journal of Agriculture and Rural Development.* 2005; 6: 182-187. ISSN: 1595-9716

URL: http://www.ajol.info/viewarticle.php?jid=12&id=24361&layout=abstract

Abstract: Camels are adapted to the arid and semi arid lands (ASAL), but their full milking potential is affected by udder infection especially sub-clinical mastitis. The purpose of this study was to identify the most common pathogens responsible for sub-clinical mastitis in camels kept under ranch conditions in Northern Kenya. A total of 435 camel milk samples were collected over a period of 11 months and examined for mastitis causing microorganisms. Mastitis causing bacteria were isolated from 66.7% of the samples. The most prevalent groups were group D streptococci (30%), coagulase negative *Staphylococcus* (CNS) (20.1%), *Staphylococcus aureus* (16%), *Streptococcus dysgalactiae* (3.6%) and *Streptococcus agalactiae*

(1.5%). Other isolates were Coliforms and Micrococci. *Streptococcus dysgalactiae* and *Streptococcus agalactiae* had a greater association with sub-clinical mastitis than the other pathogens. *Streptococcus agalactiae* and *Staphylococcus aureus* were ranked as infectious pathogens while group D streptococci, *Streptococcus dysgalactiae,* CNS, Coliforms and Micrococci were ranked as environmental pathogens. The mean milk yield from quarters infected with infectious streptococcal pathogens was 1.58 L per milking, which was lower than that from quarters infected with environmental streptococci (2.63 L). Sub-clinical mastitis in camels has adverse implications and needs to be addressed in order to maximize camel production in the ASAL.
Descriptors: dromedary camels, camel milk yield, subclinical mastitis, udder quarters, coliform bacteria, coagulase negative staphylococci, *Staphylococcus aureus,Streptococcus agalactiae*, *Streptococcus dysgalactiae*, semiarid climate, Kenya.

Mohamed, HE; Mousa, HM; Beynen, AC. **Ascorbic acid concentrations in milk from Sudanese camels.** *Journal of Animal Physiology and Animal Nutrition*. 2005; 89(1/2): 35-37. ISSN: 0931-2439
Abstract: The present study in Sudanese camels was done to describe the associations between vitamin C concentrations in milk, and either breed, stage of lactation, parity or the presence of mastitis. A total of 2586 camels were sampled. Arabi camels had higher ascorbic acid levels in milk than did either Anafi or Bishari camels. Milk ascorbic acid levels were higher for camels more than 180 days in lactation than for those earlier in lactation. Multiparous vs. primiparous camels had higher ascorbic acid concentrations in their milk. The ascorbic acid content of colostrum was higher than that of milk. Mastitis was associated with a decrease in the ascorbic acid content of both milk and blood plasma.
Descriptors: dromedary camels, lactation stage, camel milk, colostrum, ascorbic acid, vitamin C levels, breed differences, mastitis, Sudan, East Africa.

Saparov, G; Annageldiyev, O. **Meat productivity of the camel Arvana breed and ways to increase it.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 211-214. ISBN: 1586034731
Descriptors: dromedary camels, Arvana breed, camel breeding, camels for meat production, weaning young animals, growth rates, feed concentrates, feeding, finishing, camel meat quality, camel carcass composition and quality, Turkmenistan, Central Asia.

Zadi-Karam, H; Karam, NE. **Bacteries lactiques du lait de chamelle. [Lactic acid bacteria from camel milk.]** *Rencontres Autour des Recherches sur les Ruminants*. 2005; 12: 399. ISSN: 1279-6530. Note: In French.
Descriptors: camels, camel milk, lactic acid bacteria strains.

2004

Barbosa, M; Suhren, G; Beukers, R. **Suitability and application of available test kits for the detection of residues of antimicrobials in milk from species other than the cow - a review.** *Bulletin of the International Dairy Federation.* 2004; (390): 30-40. ISSN: 0250-5118
URL: http://www.fil-idf.org/content/Default.asp?PageID=453

Abstract: The production of milk, cheese and other dairy products from species other than the cow (that is, sheep, goat, buffalo, camel and less often the mare, reindeer and yak) has been very important in many countries around the world for millennia. In particular the application of goat and sheep milk for this purpose is widespread in the Mediterranean basin, the Middle-East countries and in the arid zones of many developing countries. In more recent times the demand for these products has been increasing due to their unique dietary and gastronomic characteristics. As the production and marketing of these products becomes more prevalent throughout the world there is also increasing expectation from the consumer that they will be safe and wholesome. One aspect of a safe food is the expectation that it is free from antimicrobial drug residues. Various test methods that were developed for the screening of cow milk for residues of antimicrobial drugs are now being applied to milk from other species in the control or surveillance systems of many countries. The outcomes of several studies indicate that, while these methods may be suitable, there is a need to evaluate and validate the tests further for their intended field of application. A major area of concern is the difference in composition of the milk from various species and its effect on the test performance. In addition, information is given about the control systems implemented in some countries for milk from these animals. Reproduced with permission of CAB.
Descriptors: dromedary camels, mares, sheep, buffaloes, yaks, goats, livestock derived milk, antibiotic residue detection, testing methods, literature reviews.

Faye, B. **Dairy productivity potential of camels.** *ICAR Technical Series.* 2004; (11): 93-104. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Abstract: While it is recognized that the camel has the ability to produce more milk than the cow in similar conditions, camel milk productivity is not well known. Data from the literature are scarce, mainly issued from observations in research stations, and more rarely from pastoral areas where performance monitoring is not common. Elsewhere, the data are not homogeneous among the authors: mean daily yield, total yield per lactation, herd average. Therefore comparisons are not easy. Furthermore, there is a high variability of reported productions which leads to suppose a potential for selection on that criterion. This selection is possible but rarely achieved except in the Soviet Union period for dromedary and Bactrian camels. The world production of camel milk was officially estimated at 1.3 million tons in 2002. However, according to the high level of self-consumption and the individual potential, this production could probably be higher (i.e. 5.4 million tons). The individual production varies between 1 000 and 12 000 litres per lactation according to some sources. The lactation curve is similar to bovine with a better persistence. The lactation length is very variable (from 8 to 18 months in general), i.e. longer than that for dairy cattle in similar conditions. Obviously, the feeding and seasonal conditions have an impact on those performances. Some intensified systems found in many places showed good prospects in camel milk production to supply populations from arid lands. Reproduced with permission of CAB.
Descriptors: dromedary camels,lactation, lactation curve, milk production, milk yield, milk yielding animals, performance, USSR.

Gaili, ESE; Al Eknah, MM; Sadek, MH. **Comparative milking performance of three types of Saudi camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 442-447. ISBN: 8190114123
Descriptors: dromedary camels, breed differences, lactation, lactation stage, dairy performance, camel milk production, camel milk yield, camel milk composition, ash, lactose, milk fat yield, milk protein yield, Saudi Arabia.

Guliye, AY; Yagil, R; Hovell, FDD. **Milk composition of Bedouin camels under semi-nomadic production system.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 428-433. ISBN: 8190114123
Descriptors: dromedary camels, lactation, lactation state, camel milk composition, ash, chloride, dry matter, lactose, milk fat percentage, milk production, milk protein percentage, milk quality, osmotic pressure, parity, pH, nomadic social systems, Israel.

Hertrampf, JW. **Das "Wustenschiff" als Fleischlieferant: Eine Betrachtung zum Verzehr von Kamelfleisch.[The "ship of the desert" as a meat supplier.]** *Fleischwirtschaft*. 2004; 84(12): 111-114. ISSN: b0015-363X. Note: In German with an English summary.
URL: http://www.fleischwirtschaft.de/
Abstract: The camel is a multipurpose animal. It yields labour, milk, meat, wool and leather. The camel has been domesticated around 3,000 to 2,500 years a.c. ago in the south of the Arabic peninsula. Since its domestication, the camel has always provided men with protein and energy. In the Islamic world, the camel is slaughtered for ritual purposes. However, not all tribes of the Middle East, Africa and the Sub-continent consume camel meat. The camel meat is slightly different to that of cattle. Selective breeding of camels for certain properties, e.g. meat, is still in the infant stage. So far, camels are slaughtered predominantly at the time their labour performance and milk yield declines or the camel cow is infertile. Camel's meat yield is depending on the age of the animals and the environmental condition it is living in. In addition the camel breed is important for the meat yield. Birth weight of dromedary calves are highest in India and lowest in Tunisia. Consequently the recorded daily weight gain varies widely. This applies also for the carcass yield of adult animals. The carcass of dromedaries is lighter (mean weight 274.0 kg) than those of the Bactrian camel (312.3 kg). Male dromedaries are heavier (283.2 kg) than females (249.5 kg). The chemical composition of camel meat is not much different to the chemical composition of cattle meat. Camel meat is generally lean. It is missing both inter as well as intra muscular fat. However, with increasing age of the animals, the meat is tough. Reproduced with permission of CAB.
Descriptors: Bactrian camel, dromedary camel, body fat, camel meat, carcass quality, meat chemical composition, weight gain.

Kamoun, M. **Meat recording systems in camelids.** *ICAR Technical Series.* 2004; (11): 105-130. ISSN: 1563-2504. ISBN: 9295014065. Note: In: R. Cardellino; A. Rosati; C. Mosconi (Editors) "Current Status of Genetic Resources, Recording and Production Systems in African, Asian and American Camelids, Sousse, Tunisia, 30 May 2004."
Abstract: There are very few data on meat recording systems in camelids, particularly on the relationships among production systems (conditions), growth, fattening, body size, and

qualitative aspects. These aspects regarding camelids will be discussed. Furthermore, work on Tunisian dromedary will be presented for illustration and comparison. These research were mainly conducted for several years at the Ecole Superieure d'Agriculture Mateur. This works concerned growth, fattening and carcass and meat quality on camel reared from birth until on-station slaughtering. Data were collected each four weeks on conformation traits and animals were weighed each two weeks. Studies on growth of dromedaries revealed a significant relationship between daily gain (y=282+5.4x) (y in g) and daily intake of concentrate (x, in g per kg lw0.75). The growth of youngest dromedary has been modeled and data on linear growth permitted to determine a prediction formula for live weight. After slaughtering 15 males aged from 15 to 50 months and weighing between 280-560 kg were used to examine the following aspects: slaughtering and jointing yield, carcass tissue composition, and meat quality. Results concerning growth, quality and yield of carcass are discussed in order to draw some practical conclusion regarding potential recording systems for camelids on production traits and eventually to identify future axes for research. Reproduced with permission of CAB.

Descriptors: dromedary camels, recording systems on production traits, camelids, carcass composition, carcass quality, carcass yield, feed intake, finishing, growth, live weight gain, meat quality, Tunisia.

Mekonnen , GA. **Meat production potential of Issa type camels under traditional management systems in Eastern Ethiopia.** *Bulletin of Animal Health and Production in Africa.* 2004; 52(4): 215-220. ISSN: 0378-9721. Note: In English with a French summary.

Abstract: The study was conducted to assess the meat production potential of the Issa type of camel in Eastern Ethiopia, which were raised under traditional management and depended on bushes and shrubs for their diet. Data analysed were from mature adult camels (>10 years old) slaughtered in the Dire Dawa municipal abattoir (n=108). Before slaughter, the live weights of the camels were estimated using Boue's technique. The average live weights were 444.8 and 439 kg while the average carcass weights were 327 and 261.5 kg respectively for males and females. Both the live and carcass weights differed significantly between males and females (P<0.05). The live to carcass weight ratio (L:C) calculated for males and females were 1:0.54 and 1:0.48 respectively. The average weights of the forequarters, hindquarters, and the hump were 71.6+or-11.6, 60.8+or-8.8 and 7.5+or-4.4 kg for males and 62.8+or-9.9, 54.1+or-14.9 and 7.4+or-2.9 kg for females respectively. The different cuts for males were superior in weight to those of the females; however, a significant difference (P<0.05) was seen only for the weights of fore quarters, neck, muscles of the back (longissimus dorcis, fascia and associated muscles) and pectoral plus ventral abdominal muscles.

Descriptors: dromedary camels, Issa type camels, camel husbandry, camels for meat production, body weight, carcass quality, carcass weight, sex differences, slaughter premiums, Abyssinia, Ethiopia.

Wernery, U; Juhasz, J; Nagy, P. **Milk yield performance of dromedaries with an automatic bucket milking machine.** *Journal of Camel Practice and Research.* 2004; 11(1): 51-57. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: This study was carried out to monitor the milk yield of 16 dromedaries over a

period of one year after milking with an automated bucket milking machine. The equipment and its use for milking dromedaries were described. Dromedaries from the United Arab Emirates were milked with an automatic bucket milking machine for 12 months. The camels produced a total of 21 959.9 kg of milk, with a daily milk yield of 4.8 kg each. The milk production followed a typical lactation curve, with the highest milk yield during the first months after parturition. Milk production was significantly dependent on how often the camels were milked per day and when milking was started after parturition. It seemed that young camels could be removed from the dam without any negative effect on the milk yield. A herringbone stand was suitable for milking dromedaries. Dromedaries entered the stand effortlessly without any sign of stress or discomfort. The automatic bucket milking machine using 25 mm silicon liners was accepted by all the 16 dromedaries without any problem. Machine stimulation was abandoned, because it caused udder oedema and mastitis. Hand stimulation of 2-3 min was well-accepted, and the duration was decreased after the first 3 months of milking. Milking was performed with a vacuum pressure of 36-40 kPa and a pulsation rate of 60:40 with 90 cycles per min. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel milk, bucket milking machines, dairy performance, equipment, herringbone parlors, lactation curve, mammary edema, mastitis, milk production, milk yield, milk yielding animals, milking, milking machines, United Arab Emirates.

Arabian: Protozoal Diseases

2008

Bornstein, S; Gluecks, IV; Younan, M; Thebo, P; Mattsson, JG. ***Isospora orlovi* infection in suckling dromedary camel calves (*Camelus dromedarius*) in Kenya.** *Veterinary Parasitology*. 2008; 152(3/4): 194-201. ISSN: 0304-4017

Abstract: Outbreaks of isosporosis in young suckling dromedary camel calves (*Camelus dromedarius*) in Dubai, UAE and in Kenya were recently described. In the former outbreak the pathogen was shown to be *Isospora orlovi* by morphological features and was later characterized molecularly. In the present study, we have made a longitudinal investigation of 159 suckling dromedary calves <=12 weeks of age belonging to 8 ranched camel herds (M1) in Northern Kenya. The study was carried out during 18 months. In three of the herds frequent samples were taken irregularly every 1-6 weeks. All calves <=12 weeks of age present in the respective herds were sampled during the visits. In addition, 91 calves of the same age group but belonging to 42 pastoral herds (M2) in Northern Kenya were point sampled at convenience. Faecal samples from each calf were taken and the faeces were investigated for coccidia. Samples found with coccidian oocysts were suspended in a 2% potassium dichromate solution. *Isospora* sp. was identified and samples with relatively high numbers of *Isospora* sp. were analysed molecularly. The SSU rRNA gene and internal transcribed spacer 1 (ITS1) were amplified with primers complementary to conserved regions of the SSU rRNA gene in eukaryotes as well as a conserved part of the 5.8S rRNA gene of *Eimeria.* A relatively high number of the calves exhibited diarrhoea, 30.2% and 41.8% in the M1 and M2 herds, respectively. *Isospora* sp. was only found in diarrhoeic calves or in calves convalescent from recent scouring periods. No calf >8 weeks of age was found to be excreting *Isospora* sp. The parasite was only found in calves <=4 weeks of age in the M1 herds and in the M2 herds in calves <8 weeks of age. Of the M1 and M2 calves exhibiting diarrhoea, 20.8% and 26.3% excreted Isospora sp., respectively. Morphologically the *Isospora* sp. was similar to *I. orlovi* and sequence analysis of the SSU rRNA gene from four Kenyan isolates (unfortunately only from the pastoral herds, M2) and ITS 1 segments from three of the isolates from Kenya and one from Dubai, confirmed that the *Isospora* isolates belonged to the species *I. orlovi*, and that the sequences were similar to the Dubai isolates.

Descriptors: dromedary camel, calves, amplification, characterization, diarrhea, disease prevalence, disease surveys, epidemiology, feces, genes, nucleotide sequences, outbreaks, ribosomal RNA, sucklings, coccidian, *Isospora*, *Isospora orlovi*, disease surveillance, feces, rRNA, scouring, Kenya.

Desquesnes, M; Bossard, G; Patrel, D; Herder, S; Patout, O; Lepetitcolin, E; Thevenon, S; Berthier, D; Pavlovic, D; Brugidou, R. **First outbreak of *Trypanosoma evansi* in camels in metropolitan France.** *Veterinary Record* (London). 2008 June 7; 162(23): 750-752. ISSN: 0042-4900

NAL call no: 41.8 V641

Abstract: The first outbreak of trypanosomosis caused by *Trypanosoma evansi* in camels in France was reported on a farm in the Aveyron Department. Five camels were imported from the Canary Islands to the farm in early July 2006, and trypanosomes were observed on a stained blood smear from one of them, which died in October. On further investigations, trypanosomes were observed in the blood of five camels, three of them indigenous to the farm and two that had been imported. On the basis of microscopical examination (morphological criteria and measurements) and serological results based on the card agglutination *T. evansi* test and PCR typing, the parasites were identified as *T. evansi*. After treatment with melarsomine, the infected camels rapidly became negative by parasitological tests and were negative two to four months later by serological tests. The parasite was probably transmitted by tabanids and *Stomoxys calcitrans,* which were abundant in July to September 2006. No parasites were observed in other animals on the farm or on neighbouring farms, but some of the sheep on these farms were positive by PCR or serology. Reproduced with permission from CAB.
Descriptors: camels, *Trypanosoma evansi*, disease outbreaks, France.

Ghazi, YA; Farghaly, AA; Mahmoud, KGM; Ghazy, AA. **Preliminarily studies on chromosomal abnormalities and sister chromatid exchanges associated with trypanosomosis in relation to male camel fertility.** *Asian Journal of Animal and Veterinary Advances*. 2008; 3(4): 254-262. ISSN: 1683-9919
Abstract: A total of 42 male camels in a private farm located at the Ismailia province in Egypt during 2004-05 were examined by parasitological and direct agglutination tests for the diagnosis of trypanosomiasis. The prevalence levels were 15 and 33 (35.71 and 78.57%, respectively) by parasitological and direct agglutination card tests, respectively. Nine infected male camels with trypanosomiasis were selected to study the chromosomal aberrations and sister chromatid exchange (SCEs) frequency and to determine the level of testosterone. The frequencies of chromosomal structural aberrations in male camels with trypanosomiasis significantly increased (7.78+or-0.88) compared to that in non-infected control group (2.22+or-0.55). An increase in the structural aberrations was observed in the form of fragment, deletions, gaps and breaks. A significant increase in the frequency of SCEs was observed more in diseased than in healthy camels. Thus, chromosomal abnormalities and SCEs might be implicated in the pathogenesis of trypanosomiasis. Reproduced with permission of CAB.
Descriptors: dromedary camels, 42 males, trypanosomiasis testing, disease prevalence, disease surveys, chromosome aberrations, chromosome breakage, deletions, male fertility, *Trypanosoma*, pathogenesis, sister chromatid exchange, testosterone levels, Egypt.

Kvac, M; Sak, B; Kvetonova, D; Ditrich, O; Hofmannova, L; Modry, D; Vitovec, J; Xiao, LH**: Infectivity, pathogenicity, and genetic characteristics of mammalian gastric *Cryptosporidium* spp. in domestic ruminants.** *Veterinary Parasitology*. 2008; 153(3/4): 363-367. ISSN: 0304-4017
Abstract: Farm ruminants were infected experimentally with four mammalian gastric *Cryptosporidium*, namely *Cryptosporidium andersoni* LI03 originated from cattle and three isolates of *Cryptosporidium muris* from brown rat (isolate RN66), Bactrian camel (isolate CB03) and

firstly characterized isolate from East African mole rat (isolate TS03). Sequence characterizations of the small-subunit rRNA gene showed that the LI03 isolate was *C. andersoni* and the other three isolates belonged to *C. muris*, although the TS03 isolate showed unique sequence variations (one single nucleotide change and four nucleotide insertions). C. andersoni LI03 was infectious for calves only, whereas lambs and kids were susceptible to *C. muris* CB03. *C. muris* TS03 and RN66 were not infectious for any farm ruminants. Infection dynamics including prepatent and patent period and infection intensity of the isolates used differed depending on the host species, but no clinical signs of cryptosporidiosis were observed in any of experimentally infected hosts. Cryptosporidium developmental stages were only detected in infected animals in the abomasum region. Histopathological changes were characterized by dilatation and epithelial metaplasia of infected gastric glands with no significant inflammatory responses in the lamina propria.
Descriptors: cryptosporidiosis, experimental infections, histopathology, intestines, livestock, pathogenesis, protozoal infections, *Cryptosporidium muris*, *Cryptosporidium andersoni*.

Lai, De Hua; Hashimi, Hassan; Lun, Zhao Rong; Ayala, Francisco J; Lukes, Julius. **Adaptations of *Trypanosoma brucei* to gradual loss of kinetoplast DNA: *Trypanosoma equiperdum* and *Trypanosoma evansi* are petite mutants of *T. brucei*.** *Proceedings of the National Academy of Sciences of the United States of America.* 2008 Feb 12; 105(6): 1999-2004. ISSN: 0027-8424
URL: http://www.pnas.org/
NAL call no: 500 N21P
Abstract: *Trypanosoma brucei* is a kinetoplastid flagellate, the agent of human sleeping sickness and ruminant nagana in Africa. Kinetoplastid flagellates contain their eponym kinetoplast DNA (kDNA), consisting of two types of interlocked circular DNA molecules: scores of maxicircles and thousands of minicircles. Maxicircles have typical mitochondrial genes, most of which are translatable only after RNA editing. Minicircles encode guide RNAs, required for decrypting the maxicircle transcripts. The life cycle of *T. brucei* involves a bloodstream stage (BS) in vertebrates and a procyclic stage (PS) in the tsetse fly vector. Partial [dyskinetoplastidy (Dk)] or total [akinetoplastidy (Ak)] loss of kDNA locks the trypanosome in the BS form. Transmission between vertebrates becomes mechanical without PS and tsetse mediation, allowing the parasite to spread outside the African tsetse belt. *Trypanosoma equiperdum* and *Trypanosoma evansi* are agents of dourine and surra, diseases of horses, camels, and water buffaloes. We have characterized representative strains of *T. equiperdum* and *T. evansi* by numerous molecular and classical parasitological approaches. We show that both species are actually strains of *T. brucei,* which lost part (Dk) or all (Ak) of their kDNA. These trypanosomes are not monophyletic clades and do not qualify for species status. They should be considered two subspecies, respectively *T. brucei equiperdum* and *T. brucei evansi,* which spontaneously arose recently. Dk/Ak trypanosomes may potentially emerge repeatedly from *T. brucei*.
Descriptors: horses, camels, water buffaloes, *T. brucei equiperdum, T. brucei evansi,* tsetse belt, dourine, surra, monophyletic clades, not for species status.

Manal, YI; Maijd, AM. **Association of diarrhea with congenital toxoplasmosis in calf-camels (*Camelus dromedarius*).** *International Journal of Tropical Medicine.* 2008; 3(1): 10-11. ISSN: 1816-3319

Abstract: Anti-*Toxoplasma gondii* antibodies were detected among diarrheic calf-camels - less than 12 months of age - from a three different locations in the Sudan; Butana (East), Kordofan (West) and River Nile (North). Out of 306 serum sample, 157 serum samples were seropositive by latex agglutination test (51.3%). ELISA test was applied on the sero-reacted sera, IgM and IgG were detected in sera of diarrheic calf camels and sera of recovered ones, respectively. Serum samples from 18 diarrheic calf-camels and their mothers revealed that, 12 out of 18 diarrheic calves with their mothers were sero-reacted for *Toxoplasma* antibodies while the remainder 6 calves and their mothers were sero-negative. This study revealed a wide spread of toxoplasmosis among diarrheic calf-camels. The statistical analysis using software analysis programs showed no significant differences between the three surveyed locations $p<0.05$. Statistically there was no significant difference between age groups ($p<0.05$); this may reveal an occurrence of congenital infection. A relationship between congenital toxoplasmosis and diarrhoea in calf camels was discussed. Reproduced with permission of CAB.

Descriptors: camels, mothers, calves, age groups, agglutination tests, *Toxoplasma gondii*, prenatal infection, congenital protozoal infection, congenital toxoplasmosis, diarrhea, ELISA, IgG, IgM, latex agglutination test, statistical analysis.

Reghu Ravindran; Rao, JR; Mishra, AK; Pathak, KML; Nagarajan Babu; Satheesh, CC; Sachivothaman Rahul ***Trypanosoma evansi* in camels, donkeys and dogs in India: comparison of PCR and light microscopy for detection - short communication.** *Veterinarski Arhiv.* 2008; 78(1): 89-94. ISSN: 0372-5480. Note: In English with a Croatian summary.

URL: http://www.vef.hr/vetarhiv

Abstract: The objective of the present study was to compare sensitivity and specificity of PCR and blood smear for the detection of *Trypanosoma evansi* in camels (n=61), donkeys (n=44) and dogs (n=26). Out of 131 blood samples tested, 26 samples (21 camels, 3 donkeys and 2 dogs) were detected positive by PCR. Blood smear examination revealed that *T. evansi* was only present in two camels. Reproduced with permission of CAB.

Descriptors: dogs, donkeys, dromedary camels, asses, *Trypanosoma evansi,* protozoal infections, PCR, diagnostic, techniques, diagnostic accuracy, protozoal infections; trypanosomiasis.

Saerens, D; Stijlemans, B; Baral, TN; Giang Thanh Nguyen, Thi; Wernery, U; Magez, S; Baetselier, P de; Muyldermans, S; Conrath, K. **Parallel selection of multiple anti-infectome nanobodies without access to purified antigens.** *Journal of Immunological Methods.* 2008; 329(1/2): 138-150. ISSN: 0022-1759

Abstract: A strategy was developed to isolate nanobodies, camelid-derived single-domain antibody fragments, against the parasite infectome without a priori knowledge of the antigens nor having access to the purified antigens. From a dromedary, infected with *T. evansi*, we cloned a pool of nanobodies and selected after phage display 16 different nanobodies specific for a single antigen, i.e. variant surface glycoprotein of *T. evansi*. Moreover 14 nanobodies were isolated by panning on different total parasite lysates. This anti-infectome

experiment generated nanobodies monospecific for one *Trypanosoma* species, whereas others were pan-reactive to various *Trypanosoma* species. Several nanobodies could label specifically the coat of a set of Trypanozoon species. The recognized target(s) are present in GPI-linked membrane fractions of bloodstream- and fly-form parasites. Due to the omnipresence of these targets on different parasite species and forms, these antibody fragments are a valuable source for validation of novel, not yet identified targets to design new diagnostics and therapeutics. Reproduced with permission of CAB.
Descriptors: camels, experimental transmission, *Trypanosoma evansi*, *Trypanosoma brucei,* amino acid sequences, protein sequences, antibodies, antigens, antigenicity, experimental infection, IgG, immune response, immunogenetics, isolation of parasite, diagnostics, therapeutics.

Ul Hasan, Murtaz; Muhammad, Ghulam; Gutierrez, Carlos; Iqbal, Zafar; Shakoor, Abdul; Jabbar, Abdul. **Prevalence of *Trypanosoma evansi* infection in equines and camels in the Punjab region, Pakistan.** *8th Biennial Conference of the Society for Tropical Veterinary Medicine, Hanoi, Vietnam; June 26-July 01, 2005.* Blackwell Publishing, Oxford. 2006. ISSN: 0077-8923 (print). ISBN: 9781573316378
Descriptors: 170 equines, 150 dromedary camels, prevalence of *Trypanosoma evansi* infection, pasasitological and serological examinations, found in 11camels, no positive equines, control measures discussed, Punjab, Pakistan.

Wilson, RT. **Perceptions and problems of disease in the one-humped camel in southern Africa in the late 19th and early 20th centuries.** *Journal of the South African Veterinary Association.* 2008; 79(2): 58-61. ISSN: 0038-2809
Descriptors: dromedary camels, introduction into Namibia for military purposes, camels introduced into South Africa and Rhodesia (Zimbabwe) to replace oxen, concerns regarding introductions of disease, foot and mouth disease, mange, trypanosomosis, antibodies to common livestock found in later years.

2007

Ahmed, SM; Hegde, BP. **Preliminary study on the major important camel calf diseases and other factors causing calf mortality in the Somali Regional state of Ethiopia.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference " Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 31-41.
Abstract: This study was undertaken in 5 randomly selected districts of Aider zone. 15 households were selected from each district. A total of 75 households were included in this study. Random sampling technique was used. Calf mortality was seen as prenatal death due to abortion, postnatal death from first week to 3 months of calf age and before weaning period. The latter was mainly caused by some endemic diseases and other associated factors. In this study, the abortion rate was 16% and was caused by several factors. These included accidental death of fetus and trypanosomiasis, which contributed 64.3 and 28.6%, respectively, in the case of Jarati, whereas trypanosomiasis and stress conditions contributed 40 and 46.7%, respectively, in the case of Hargelle. On the other hand, stress conditions caused by

adverse environmental conditions and unidentified poisonous plants contributed 26.7 and 73.3%, respectively, in the case of Barey. Similarly, trypanosomiasis, accidental death and stress conditions and browsing of poisonous plants contributed 33.3, 40.0, 20.0 and 6.7%, respectively, in the case of Dollo-Bay. With regard to El-kari district, about 66.7, 26.7 and 6.7% of respondents claimed that abortion was caused by accidental deaths, poisonous plants and stressful conditions, respectively. On the other hand, calf death was very high during the first week after birth. About 60, 50, 55, 45, 35% of Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggested that an average 51% of calf losses were encountered during the first week of calves. Calf mortality of about 30% was encountered during the first 90 days of calf age, whereas the remaining 19% were encountered after 90 days of calf life before weaning. Poor colostrum feeding practice was also believed to be one of the major causes of calf mortality during the first week of life. Furthermore, some endemic diseases and other associated factors were also reported to be among the major causes of calf mortality during the lactation period before weaning. The most important disease found was calf scour (daab). The morbidity and mortality rates of calf scour were 87 and 39%, respectively. Sunken eye (ilqod) was considered as the second problematic disease of calves by herders. The disease caused serious economic losses to the households through loss of milk after death of the calves. The morbidity and mortality rates due to sunken eyes were 57 and 12%, respectively. Contagious ecthyma (canbaruur) was considered as one of the important diseases of calves by herders. The morbidity and mortality rates of contagious ecthyma were 75 and 6.9%, respectively. Contagious necrotic skin was also considered as one of the important diseases of calves by herders. About 88% of all districts reported that the disease affected their calves with morbidity and mortality rates of 35 and 4.6%, respectively. Other endemic diseases reported were trypanosomiasis with morbidity and mortality rates of 9.6 and 6.7%. Camel pox had morbidity and mortality rates of 42 and 7%, respectively. Pneumonia had a mortality rate of 7%. On the other hand, factors causing calf losses included predation which was about 4.8, 23.8, 26.6, 16.7, and 26.2% in Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggesting that predators were considered next to diseases in causing calf mortality. Reproduced with permission of CAB.

Descriptors: dromedarycamels, calves, fetal abortion, age differences, animal diseases, anthrax, camel milk, colostrum, deformities, diarrhea, losses scarcoptes mange, morbidity, mortality, necrosis, pneumonia, poisoning, poisonous plants, predation, stress, toxicity, trypanosomiasis, viral diseases, *Bacillus anthracis*, Contagious ecthyma virus, plants, *Trypanosoma*, contagious pustular dermatitis, CPD virus, death rate, diarrhea, orf virus, scabby mouth, sore mouth, toxic plants, toxicosis, trypanosomosis, ulcerative dermatosis, viral infections, Abyssinia, Ethiopia.

Dedet, JP. **Les decouvertes d'Edmond SERGENT sur la transmission vectorielle des agents de certaines maladies infectieuses humaines et animales. [Edmond Sergent's discoveries on the vectorial transmission of agents of human and animal infectious diseases.]** *Bulletin de la Societe de Pathologie Exotique.* 2007; 100(2): 147-150. ISSN: 0037-9085. Note: In French with an English summary.

URL: http://www.pathexo.fr

Abstract: Edmond Sergent has been head of the Institut Pasteur in Algeria during 1910-63, and during those years, carried out an impressive scientific research and studied a lot of

agents responsible for human, animal and plant diseases. In the field of vectorial transmission of infectious diseases, he made two essential discoveries: the transmission of cosmopolitan relapsing fever by human body louse in 1908, a year before Charles Nicolle discovered the transmission of the classical exanthematic typhus by the same insect, and the transmission of cutaneous leishmaniasis by the phlebotomine sandfly. Moreover, he made other discoveries in similar fields, such as the transmission of dromedary trypanosomiasis by Tabanids, and later by *Stomoxys calcitrans*, and the transmission of the pigeon *Haemoproteus* by *Lynchia maura*. Finally, he described the transmission of *Theileria dispar* (now *T. annulata*) by the tick *Hyalomma mauritanicum* (1928). Reproduced with permission of CAB.
Descriptors: Edmond Sergent, Insitut Pasteur, early researcher, animal and human diseases, medical entomologist, veterinary entomology, disease transmission, disease vectors, vector borne diseases, cutaneous leishmaniasis, louse borne typhus, protozoal infections, trypanosomiasis, dromedary camels, pigeons, *Haemoproteus*, *Hyalomma*, *Leishmania,* Phlebotominae, *Pseudolynchia canariensis*, *Rickettsia prowazekii*, *Stomoxys calcitrans,* Tabanidae, *Theileria annulata*, *Trypanosoma*, *Hyalomma mauritanicum*, *Lynchia maura*.

Fouda, TA; Al Mujalii, AM. **Pneumo-enteritis in Arabian camel-calves (*Camelus dromedarius*): clinical and laboratory investigations.** *Journal of Camel Practice and Research.* 2007; 14(2): 119-124. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Seventeen diseased Arabian camel calves (*Camelus dromedarius*), 1-3 months of age in addition to the 5 more apparently healthy calves have been involved in this study. The selected animals were admitted with varying clinical disease conditions, but all had general history of diarrhoea, inappetence and poor body conditions. Based on the results of clinical and laboratory examinations, the diarrhoeic calves were allotted into 2 groups; Group (1) involved calves with bacterial diarrhoea and respiratory manifestations, while group (2) included diarrhoeic calves because of protozoal infestations. Blood samples for complete blood counts and biochemical analysis were obtained from all diseased and healthy calves. In addition, rectal as well as nasal swabs and faecal samples were also obtained from the diseased calves and were subjected to bacteriological and parasitological examinations. The most prominent clinical signs among diseased calves were profuse watery, yellowish diarrhoea with offensive smell, elevated rectal temperatures and respiratory distress, varying degrees of dehydration, poor body conditions and reluctant to suckling their dams. Bacteriological examination revealed that *E. coli* and *Proteus* spp. was the incriminated micro-organism causing diarrhoea and *Staph. aureus* was the causative agent of respiratory troubles in diseased calves of group (1), while parasitic examination indicated that *Eimeria* spp. and *Balantidium coli* were responsible for diarrhoea in calves of group (2). The obtained results of haemogram revealed significant increase in the mean values of total leucocytic counts and packed cell volume in diseased calves with either bacterial or parasitic diarrhoea if compared with their values in healthy control calves. Differential leucocytic counts showed varying patterns as in the diarrhoeic calves with *E. coli* and *Proteus* infections. There is neutrophilia, while those calves with parasitic diarrhoea had eosinophilia. Biochemical analysis of blood sera samples revealed significant elevation in the mean values of potassium and blood urea nitrogen with significant reduction in the mean values of total proteins, albumin, sodium and chloride in the diarrhoeic calves of both groups if compared with their values in the healthy control

group. The diseased calves showed varying response to the treatment protocols with gradual improvement within 2 weeks. Reproduced with permission of CAB.
Descriptors: dromedary camels, etiology, bacterial diseases, protozoal infections *Balantidium coli*, *Eimeria*, *Escherichia coli*, *Proteus*, *Staphylococcus aureus*, clinical aspects, diarrhea, respiratory diseases, intestinal diseases.

Gillingwater, K; Buscher, P; Brun, R. **Establishment of a panel of reference *Trypanosoma evansi* and *Trypanosoma equiperdum* strains for drug screening.** *Veterinary Parasitology.* 2007; 148(2): 114-121. ISSN: 0304-4017
DOI: http://dx.doi.org/10.1016/j.vetpar.2007.05.020
Abstract: The animal pathogenic protozoan, *Trypanosoma evansi*, leads to a wasting disease in equines, cattle and camels, commonly known as Surra. It is extensively distributed geographically with a wide range of mammalian hosts and causes great economical loss. *Trypanosoma equiperdum* causes a venereal disease called Dourine in horses and donkeys. Chemotherapy appears to be the most effective form of control for *T. evansi*, whereas infections caused by *T. equiperdum* are considered incurable. Due to emerging drug resistance, efficient control of *T. evansi* is severely threatened, emphasising the urgent need to find new alternative drugs. A drug profile for a panel of *T. evansi* and *T. equiperdum* strains has been established for the four standard drugs currently used in treatment. The 3H-hypoxanthine incorporation assay was used to obtain 50% inhibitory concentration (IC< sub>50</ sub>) values for each standard drug against the various strains. The results indicate the presence (and in some cases, the emergence) of drug resistance in several strains. This panel of characterised strains with known drug sensitivities and resistances will be of great value for the screening of new active compounds, in comparison with the four standard drugs currently available.
Descriptors: dromedary camels, cattle, horses, drug resistance, multiple drug resistance, drug testing, protozoal infections, resistance mechanisms, Dourine, Surra, trypanosomiasis, *Trypanosoma equiperdum*, *Trypanosoma evansi,* protozoal diseases.

Glucks, IV. ***The Prevalence of Bacterial and Protozoal Intestinal Pathogens in Suckling Camel Calves in Northern Kenya.*** Published by Freie Universitat Berlin, Berlin Germany. 2007; v + 122 pp. Note: In English with a German summary. A thesis.
Abstract: The prevalence of bacterial and protozoal agents in dromedary camel calves up to 12 weeks of age was studied in northern Kenya during 2002-2004. A higher percentage of 229 camels with diarrhoea was found in the pastoralist herds (31.9%) compared to the ranch herds (19.2%). Diarrhoea peaked at 2-3 weeks of age in both systems. A total of 6.6% of 197 camels were shedding *Isospora orlovi* and *Strongyloides* spp., while 4.6% were shedding *Strongylus* sp. eggs. These parasites were higher in the pastoralist herds. *Klebsiella pneumoniae* was isolated in 119 (26.9%) of camel calves, while *Salmonella* sp. and *Escherichia coli* were found in 226 (19.1%) and 200 (97.5%) camels, respectively. The point prevalences of *K. pneumoniae* and *Salmonella* sp. were higher at 3 weeks of age. No *K. pneumoniae* was isolated in animals older than 6 weeks, while Salmonella was present until 12 weeks. *E. coli* was constantly present in all age groups. There was no difference in point prevalences in *K. pneumoniae* and *Salmonella* sp. between pastoralist and ranch systems. Analysis of camels without (Category A) and with diarrhoea (Category B) showed that *Strongylus* and *Strongyloides* spp. were present in both groups but were higher in Category B, while *I. orlovi* sp.

was only present in Category B. *K. pneumoniae* was more prevalent in camels at 10 weeks of age and were less common in older animals. There was a higher prevalence of infection in Category B (25.3%) than in Category A (12.5%). *Salmonella* was high at 2 weeks of age and then decreased. It was also higher in Category B (43.6%) compared to a A (22.7%). *E. coli* was found in both categories at different ages. 62.9% of the 62 *K. pneumoniae* isolates were found in diarrhoeic or dead camels. *S. bovismorbificans* was the most common serotype (32.6%) followed by *S. butantan* (21.5%), *S. typhimurium* (11.1%), *S. kiambu* (9.0%) and *S. muenchen* (7.6%). *S. typhimurium* and *S. adelaide* were found in both management systems. Only *S. typhimurium* was commonly associated with disease (81%). Virulence-associated genes were detected in 78 *E. coli* isolates in healthy, diarhhoeic and recovering camels, while none were found in dead animals. There was no indication that *E. coli* has a significant role in the diarrhoea complex of camel calves up to 12 weeks of age. Reproduced with permission from CAB.

Descriptors: dromedary camels, age differences, bacterial infectious diseases, diarrhea, disease prevalence, disease surveys, epidemiological surveys, epidemiology, farming systems, mortality, nematode infections, pastoralism, protozoal infections, ranching, virulence, *Escherichia coli*, *Isospora orlovi*, *Klebsiella pneumoniae*, *Salmonella typhimurium*, *Strongyloides*, *Strongylus*, *Rhabditida*, *Salmonella adelaide*, *Salmonella bovismorbificans*, *Salmonella butantan*, *Salmonella kiambu*, *Salmonella muenchen*, *Secernentea*, Kenya.

Glucks, IV. ***The Prevalence of Bacterial and Protozoal Intestinal Pathogens in Suckling Camel Calves in Northern Kenya.*** Published by Freie Universitat Berlin, Berlin Germany. 2007; v + 122 pp. Note: In English with a German summary. A thesis.

Abstract: The prevalence of bacterial and protozoal agents in dromedary camel calves up to 12 weeks of age was studied in northern Kenya during 2002-2004. A higher percentage of 229 camels with diarrhoea was found in the pastoralist herds (31.9%) compared to the ranch herds (19.2%). Diarrhoea peaked at 2-3 weeks of age in both systems. A total of 6.6% of 197 camels were shedding *Isospora orlovi* and *Strongyloides* spp., while 4.6% were shedding *Strongylus* sp. eggs. These parasites were higher in the pastoralist herds. *Klebsiella pneumoniae* was isolated in 119 (26.9%) of camel calves, while *Salmonella* sp. and *Escherichia coli* were found in 226 (19.1%) and 200 (97.5%) camels, respectively. The point prevalences of *K. pneumoniae* and *Salmonella* sp. were higher at 3 weeks of age. No *K. pneumoniae* was isolated in animals older than 6 weeks, while Salmonella was present until 12 weeks. *E. coli* was constantly present in all age groups. There was no difference in point prevalences in *K. pneumoniae* and *Salmonella* sp. between pastoralist and ranch systems. Analysis of camels without (Category A) and with diarrhoea (Category B) showed that *Strongylus* and *Strongyloides* spp. were present in both groups but were higher in Category B, while *I. orlovi* sp. was only present in Category B. *K. pneumoniae* was more prevalent in camels at 10 weeks of age and were less common in older animals. There was a higher prevalence of infection in Category B (25.3%) than in Category A (12.5%). *Salmonella* was high at 2 weeks of age and then decreased. It was also higher in Category B (43.6%) compared to a A (22.7%). *E. coli* was found in both categories at different ages. 62.9% of the 62 *K. pneumoniae* isolates were found in diarrhoeic or dead camels. *S. bovismorbificans* was the most common serotype (32.6%) followed by *S. butantan* (21.5%), *S. typhimurium* (11.1%), *S. kiambu* (9.0%) and *S. muenchen* (7.6%). *S. typhimurium* and *S. adelaide* were found in both management systems.

Only *S. typhimurium* was commonly associated with disease (81%). Virulence-associated genes were detected in 78 *E. coli* isolates in healthy, diarhhoeic and recovering camels, while none were found in dead animals. There was no indication that *E. coli* has a significant role in the diarrhoea complex of camel calves up to 12 weeks of age. Reproduced with permission from CAB.

Descriptors: dromedary camels, age differences, bacterial infectious diseases, diarrhea, disease prevalence, disease surveys, epidemiological surveys, epidemiology, farming systems, mortality, nematode infections, pastoralism, protozoal infections, ranching, virulence, *Escherichia coli*, *Isospora orlovi*, *Klebsiella pneumoniae*, *Salmonella typhimurium*, *Strongyloides*, *Strongylus*, *Rhabditida*, *Salmonella adelaide*, *Salmonella bovismorbificans*, *Salmonella butantan*, *Salmonella kiambu*, *Salmonella muenchen*, *Secernentea*, Kenya.

Khalil, KM; Gadir, AEA; Rahman, MMA; Yassir, OM; Ahmed, AA; Elrayah, IE. **Prevalence of *Toxoplasma gondii* antibodies in camels and their herders in three ecologically different areas in Sudan.** *Journal of Camel Practice and Research.* 2007; 14(1): 11-13. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A total of 153 serum samples from dromedary camels (*Camelus dromedarius*) and 45 serum samples from their drivers and herders from Butana plains, North Kordofan and South Kordofan, Sudan, were tested for *Toxoplasma gondii* antibodies by the latex agglutination test (LAT) [date not given]. The seroprevalence rate among camels and camel herders was 22.2 and 53.3%, respectively, using LAT. There was a relationship between prevalence rate in camel and their herders in Butana plains ($P<0.05$) but no significant relationship was found between age in camel herders and seroreactivity ($P>0.05$). The study suggests the wide spread of infection of *T. gondii* among camel drivers who consume unboiled camel milk and raw liver which, is important from a public health view point.

Descriptors: dromedary camels, humans, camel drivers, camel herders, toxoplasmosis, exposure to zoonotic parasitic disease, high levels of *Toxoplasma gondii,* raw camel milk, raw liver, antibodies, antibody testing, latex fixation test, disease prevalence, disease surveys, disease transmission via raw camel milk, raw liver, epidemiological surveys; epidemiology, geographical variation, latex agglutination test, serological surveys, seroprevalence, zoonoses, Sudan.

Latif, BMA; Khamas, WA. **Light and ultrastructural morphology of sarcocystiosis in one-humped camel (*Camelus dromedarius*) in Northern Jordan.** *Journal of Camel Practice and Research.* 2007; 14(1): 45-48. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Samples of oesophagus, diaphragm, skeletal muscles and heart from 110 camels (*Camelus dromedarius*) slaughtered in Al-Ramtha province, Jordan, were examined for sarcocystosis using both muscle squash and squeezing methods [date not given]. Positive samples were processed for light (LM) and transmission electron microscopy (TEM). Sarcocysts were detected in 24 (21.8%) of 110 camels examined. The most common sites for sarcocysts location were found in the oesophagus (83.3%), followed by diaphragm (33.3%), skeletal muscles (20.8%) and heart (4.2%). These cysts were thin-walled (up to 0.8 micro m) and thick-walled (upto 1.75 micro m). They contained large numbers of banana-shaped bradyzoites and several metrocytes. The cysts are studded with villar protrusions all around extending into the myofibres where relatively large numbers of mitochondria are present.

Reproduced with permission of CAB.
Descriptors: dromedary camels, *Sarcocystis,* clinical aspects, cysts developmental stages, diaphragm, heart, histology, morphology, esophagus, sarcocystosis, skeletal muscle, Jordan.

Murtaz ul Hasan; Ghulam Muhammad; Gutierrez, C; Zafar Iqbal; Abdul Shakoor; Abdul Jabbar. **Prevalence of *Trypanosoma evansi* infection in equines and camels in the Punjab Region, Pakistan.** *Annals of the New York Academy of Sciences*. 2006; 1081: 322-324. ISSN: 0077-8923. Note: In: EF Blouin and JC Millard (Editors). "Impact of Emerging Zoonotic Diseases and Animal Health: 8th Biennial Conference of the Society for Tropical Veterinary Medicine, Hanoi, Vietnam, 26 June-1 July 2005."
DOI: http://dx.doi.org/10.1196/annals.1373.043
Abstract: A cross-sectional study was conducted to determine the prevalence of *Trypanosoma evansi* infection in susceptible hosts in Punjab, Pakistan [date not given]. 170 equines and 150 dromedary camels were examined using different serological and parasitological methods. Five (3.3%) and 6 (4%) camels were positive using parasitological and serological examinations, respectively. None of the equines tested positive using any method. These results seem to indicate that *T. evansi* infection has a relatively low prevalence in the Punjab region. However, efforts must be done to establish control measures in affected herds and avoid dissemination of the disease.
Descriptors: dromedary camels, horses, *Trypanosoma evansi,* disease prevalence, epidemiology, trypanosomiasis, Punjab, Pakistan.

Narender Singh; Pathak KML; Chaudhri, SS; Rajender Kumar **Cameline trypanosomiasis (surra) in dromedaries of Western Rajasthan, India.** *Indian Journal of Animal Sciences*. 2007; 77(8): 718-720. ISSN: 0367-8318
Descriptors: dromedary camels, *Trypanosoma evansi,* epidemiology, prevalence, trypanosomiasis, double antibody sandwich, ELISA, amplification of isolates, humid and non humid regions, Rajasthan, India.

Njiru, ZK; Constantine, CC. **Population sub-structuring among *Trypanosoma evansi* stocks.** *Parasitology Research.* 2007 Oct; 101(5): 1215-1224. ISSN: 0932-0113
DOI: http://dx.doi.org/10.1007/s00436-007-0603-y
NAL call no: QL757.P377
Abstract: To investigate the population genetic structure of *Trypanosoma evansi* from domesticated animals, we have analysed 112 stocks from camels, buffaloes, cattle and horses using the tandemly repeated coding sequence (MORF2) and minisatellite markers 292 and cysteine-rich acidic integral membrane protein (CRAM). We recorded a total of six alleles at the MORF2 locus, seven at 292 and 12 at the CRAM loci. Nei's genetic distance showed reduced allelic diversity between buffaloes and cattle stocks (1.2) as compared to the diversity between camels and buffaloes (3.75) and camels and cattle stock (1.69). The mean index of association (I A = 0.92) significantly deviated from zero, and the average number of multilocus genotypes (G/N ratio) was 0.21. Twenty-four multilocus genotypes were defined from the combination of alleles at the three loci. The Kenyan sub-populations showed F st = 0.28 and analysis of molecular variance showed significant divergence (22.7%) between the Laikipia, Kulal and Galana regions. The regional and host distribution of multi-locus geno-

types significant population differentiation and high Nei's genetic distances suggest existence of genetic sub-structuring within *T. evansi* stocks while the few multi-locus genotypes and deviation of association index from zero indicate the lack of recombination. In conclusion, this study reveals that some genetic sub-structuring does occur within *T. evansi*, which has a clonal population structure.

Descriptors : camels, buffalo, cattle, horses, domesticated animals, animals diseases, *Trypanosoma evansi,* genetic structure, tandemly repeated coding sequence (MORF2), minisatellite markers 292, cysteine-rich acidic integral membrane protein (CRAM), alleles, genetic analysis, genetic distance, genetic diversity, genotypes, population-genetics, Indonesia, Kenya, Philippines, Sudan.

Saleh , MA; Mahran, OM. **A preliminary study on cryptosporidiosis in dromedary camels at Shalatin Area, Egypt.** *Assiut Veterinary Medical Journal*. 2007; 53(112): 195-208. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: This work aimed to identify the cryptosporidial oocyst and its prevalence in dromedary camels and to estimate serum biochemical characteristics in infected camels. Microscopic survey of faecal samples from 1097 dromedary camels (aged < 6 months to >8 years) revealed that 37 (3.37%) were positive for *Cryptosporidium* oocysts by modified Ziehl-Neelsen stain. Linear regression analysis was positive between incidence of cryptosporidial infection and age. Microscopic examination of the acid-fast stained faecal smears revealed ovoid oocysts with single wall layer stained red or pink with a granular appearance. The average size (+or-SE) of the oocysts was 8.3+or-1.22x6.1+or-0.88 micro m. These morphological characters fit the description of C. muris. Serum biochemical analysis of 8 infected and 8 age-matched apparently healthy camels revealed significant reduction in the mean concentrations (+or-SE) of serum albumin (2.89+or-0.104 vs. 3.19+or-0.091 g/dl, P=0.049) and alpha -tocopherol (1.35+or-0.093 vs. 1.66+or-0.082 micro g/ml, P=0.009), whereas serum pepsinogin was doubled (866.5+or-46.42 vs 406.2+or-32.61 mU, P=0.003) in infected camels in comparison with controls. On the other hand, there were non-significant variations in the mean values of blood serum total protein, globulin, sodium, potassium and chloride of infected camels in comparison with controls. In conclusion, dromedary camels were susceptible to cryptosporidial infection with significant risk on their health. The present study should be regarded as a first step towards recognition of *C. muris* as a possible cause of gastritis in dromedary herds. More studies are needed for more identification of the parasite and to clarify its pathogenicity.

Descriptors: dromedary camels, alpha tocopherol, blood chemistry, blood picture, gastritis, cryptosporidiosis, disease prevalence, disease surveys, epidemiology, pepsinogen, serum albumin, *Cryptosporidium muris*, Egypt

Shahardar, RA; Rao, JR; Mishra, AK; Tewari, AK. **Detection of *Trypanosoma evansi* in Indian dromedary camels by polymerase chain reaction using ribosomal DNA target.** *Journal of Veterinary Parasitology*. 2007; 21(2): 105-108. ISSN: 0971-6157

URL: http://www.indianjournals.com/ijor.aspx?target=ijor:jvp&type=home

Abstract: The PCR assay was employed for detection of *Trypanosoma evansi* in Indian dromedary camels using ribosomal DNA amplimers (20 mer sense and 16 mer antisense primer) based on structural 18S and 5.8S ribosomal DNA sequences specific for kinetoplastida

taxon. The PCR was first standardized using 5 to 10 ng of *T. evansi* template DNA, and then the assay was extended to blood sample of mouse experimentally infected with *T. evansi*. After laboratory standardization, the assay was further employed for direct detection of *T. evansi* DNA in blood samples collected from camels aged 2 to 10 years from surra endemic areas of Rajasthan in India. A total of 10 blood samples were tested, six were found positive (60%) reaffirming the suitability of PCR as a sensitive diagnostic tool. Among the pathogens belonging to kinetoplastida, the dromedaries are only susceptible to single species i.e. *T. evansi*. Therefore, the PCR amplified DNA product from the camel blood using rDNA amplimers specifically represent *T. evansi*. Reproduced with permission of CAB.
Descriptors: dromedary camels, trypanosomiasis, *Trypanosoma evansi*, diagnosis, diagnostic techniques, PCR, polymerase chain reaction, Rajasthan, India.

Soltane, R; Guyot, K; Dei Cas, E; Ayadi, A. **Prevalence of *Cryptosporidium* spp. (Eucoccidiorida: Cryptosporiidae) in seven species of farm animals in Tunisia.** *Parasite*. 2007; 14(4): 335-338. ISSN: 1252-607X. Note: In English with a French summary.
NAL call no: QL57 P3737
Abstract: 1001 faecal samples were obtained from 89 sheep (lambs and adult), 184 goats, 190 horses, 178 rabbits, 110 camels, 200 broiler chickens and 50 turkeys housed in farms from different localities in Tunisia. All samples were analysed for *Cryptosporidium* oocysts by microscopic examination of smears stained by modified Ziehl Neelsen technique. The parasite was detected in 10 lambs and adult sheep (11.2%) and 9 broiler chickens (4.5%). Molecular characterization, performed in four animals, identified *C. bovis* in 3 lambs and *C. meleagridis* in one broiler chicken. This work is the first report on *Cryptosporidium* in farm animals in Tunisia.
Descriptors: parasites in farm animals, camels, broilers, lambs, goats, horses, rabbits, turkeys, chickens, broilers, poultry, feces, oocysts, *Cryptosporidium bovis*, *Cryptosporidium meleagridis*, Tunisia.

Yakhchalim, M; Cheraghi, E. **Eimeriosis in Bactrian and dromedary camels in the Miandoab region, Iran.** *Acta Veterinaria Beograd*. 2007; 57(5/6): 545-552. ISSN: 0567-8315. Note: In English with a Serbian summary.
Abstract: An investigatin into eimeriosis of camels was carried out in two camel-raising areas of Miandoab region, Iran, to determine the frequency and diversity of *Eimeria* species. Bactrian camels (n=85) and dromedary camels (n=40) which were from one to four years old were subjected to examination. Fecal samples were collected and the flotation technique was carried out to demonstrate the presence of oocysts and sporulation of oocysts. The overall prevalence was 12.8%. Five Eimeria species were identified in both camels: the highest rate belonged to the E. bactriani (42.2%), followed by E. rajasthani (only in dromedary camels, 26.7%), E. pellerdyi (only in bactrian camels, 15.6%), E. cameli (11.1%) and E. dromedarii (4.4.%). All 12.8% of infected camels had mixed infections with at least three species. Feces consistency and infection intensity had a significant correlation with age (P<0,01). The sex and age of the camels had a significant effect on prevalence (P<0.01). These findings may be useful to evaluate the infection potential when considering control programs, specially for young camels. Reprodued with permission of CAB.
Descriptors: Bactrian camels, dromedary camels, fecal testing, age differences, sex dif-

ferences, coccidiosis, disease prevalence, disease surveys, epidemiology, mixed infections, oocysts, risk factors, seasonal variation, seasonality, coccidian, *Eimeria cameli*, *Eimeria bactriani*, *Eimeria dromedarii*, *Eimeria pellerdyi*, *Eimeria rajasthani*, Iran.

Zaitoun, AMA. **Contagious skin necrosis of dromedary camels in south Egypt.** *Journal of Camel Practice and Research.* 2007; 14(2): 125-132. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Skin diseases of dromedary camels in different localities of south Egypt were surveyed during July 2002-December 2005. Forty-one (1.83%) of the examined camels (n=2237) showed signs of contagious skin necrosis (CSN). Prevalence of CSN was found increased as the age of animal increased until 5.5 years and thereafter decreased gradually with increasing age. CSN was independent of sex ($P<0.05$) and was more prevalent in the hot months ($P<0.01$). Skin diseases were more prevalent ($P<0.01$) in irrigated areas than desert lands of south Egypt. However, there was no significant variation in susceptibility of camels located in irrigated and desert areas to CSN. Staphylococcus aureus was the predominant isolated bacteria. Haemoprotozoal examinations indicated that 60.98% of the diseased camels with CSN were harbouring *Trypanosoma evansi* in their blood. The role of this parasite is discussed. Faecal analyses were insignificant.
Descriptors: dromedary camels, skin diseases, *Staphylococcus aureus*, *Trypanosoma evansi*, etiology, age differences, disease prevalence, disease surveys, epidemiological surveys, epidemiology, geographical variation, necrosis, seasonal variation, Egypt.

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Al Saad, KM; Al Obaidi, QT; Al Obaidi, WA. **Clinical, haematological and biochemical study of theileriosis in one-humped Arabian camels (*Camelus dromedarius*).** *Iraqi Journal of Veterinary Sciences.* 2006; 20(2): 211-218. ISSN: 1607-3894. Note: In English with an Arabic summary.
Abstract: A total of 35 male and female camels (*Camelus dromedarius*), 4-12 years old, were used in this study. 28 camels were naturally infected with *Theileria camelensis*, while the 7 were clinically normal (control). Results revealed that the infected camels exhibited enlargement of superficial prescapular lymph nodes, emaciation, hind limb weakness, diarrhoea, pale mucous membranes, watery eyes (lacrimation), inappetence, rough hair coat, high body temperature, tick (*Hyalomma anatolicum*) infestation on the different parts of the body, increased in body temperature, respiratory and heart rates, and slow ruminal contractions. There were significant decreases in erythrocyte count, haemoglobin, PCV and platelet count, while significant increases in mean corpuscular volume and erythrocyte sedimentation rate were observed in infected camels. Macrocytic normochromic anaemia was also observed in the infected animals. A significant increase in white blood cells due to the significant increase in lymphocytes and significant decrease in neutrophils resulted to the significant increase in aspartate aminotransferase, alanine aminotransferase, total bilirubin, blood urea nitrogen and icteric index of the infected camels. However, a significant decrease in total protein values were encountered in infected camels. It is concluded that haematological and biochemical changes are observed during theileriosis infection in camels. Reproduced with permission of

CAB.
Descriptors: dromedary camels, males and females, *Theileria camelensis,* theileriosis, thalanine aminotransferase, anemia, aspartate aminotransferase, bilirubin, blood chemistry, clinical aspects, diagnosis, disease markers, hematology, hemoglobin, leukocytes, lymphocytes, urea, Iraq.

Aradaib, IE; Majid, AA. **A simple and rapid method for detection of *Trypanosoma evansi* in the dromedary camel using a nested polymerase chain reaction.** *Kinetoplastid Biology and Disease.* 2006; 5(2); (20 May 2006) 1-6. ISSN: 1475-9292
URL: http://www.kinetoplastids.com/content/pdf/1475-9292-5-2.pdf
Abstract: A nested polymerase chain reaction (nPCR)-based assay, was developed and evaluated for rapid detection of *Trypanosoma evansi* in experimentally infected mice and naturally infected camels (*Camelus dromedarius*). Four oligonucleotide primers (TE1, TE2, TE3 and TE4), selected from nuclear repetitive gene of *T. evansi*, were designed and used for PCR amplifications. The first amplification, using a pair of outer primers TE1 and TE2, produced a 821-bp primary PCR product from *T. evansi* DNA. The second amplification, using nested (internal) pair of primers TE3 and TE4, produced a 270-bp PCR product. *T. evansi* DNAs extracted from blood samples of experimentally infected mice and naturally infected Sudanese breed of dromedary camels were detected by this nested PCR-based assay. The nested primers TE3 and TE4 increased the sensitivity of the PCR assay and as little as 10 fg of *T. evansi* DNA (equivalent to a single copy of the putative gene of the parasite) was amplified and visualized onto ethidium bromide-stained agarose gels. Amplification products were not detected when the PCR-based assay was applied to DNA from other blood parasites including *Thieleria annulata*, *Babesia bigemina* or nucleic acid free samples. Application of this nPCR-based assay to clinical samples resulted in direct detection of *T. evansi* from a variety of tissue samples collected from experimentally infected mice and blood from naturally infected camels. The described nPCR-based assay provides a valuable tool to study the epidemiology of *T. evansi* infection in camels and other susceptible animal populations.
Descriptors: dromedarycamels, mice, *Theileria annulata, Trypanosoma evansi*, *Babesia bigemina,* disease models, epidemiology, genes, laboratory animals, PCR, polymerase chain reaction, rapid methods, trypanosomiasis.

Chhabra , MB; Sangwan, AK. **Parasitic diseases of camels - an update. 1. Protozoal diseases.** *Journal of Camel Practice and Research.* 2006; 13(1): 7-14. ISSN: 0971-6777. Note: A review article.
URL: www.camelsandcamelids.com
Abstract: Protozoal diseases, particularly trypanosomiasis caused by the flagellate, *Trypanosoma evansi*, are considerable constraints on the health and productivity of the dromedary camels throughout the tropics and subtropics. With the developments in the field of molecular biology and their application in parasitic infections, there has been great progress in the diagnostic techniques. Apart from detection of parasitoses, these tests are useful aids in monitoring the effectiveness of therapeutic interventions. As a consequence, more reliable epidemiological data on the distribution and incidence of these diseases have been generated. DNA-based technologies have enabled the characterization of species, subspecies and stocks (strains) of camel-parasitizing trypanosomes. Chemotherapy and strategic control of try-

panosomiasis continue to be another fertile area which has witnessed a fair number of recent reports. Other protozoan parasites and their occasional association with disease are now being reported more frequently. These include the gut-dwelling coccidia, the tissue-cystic forms (*Sarcocystis* and *Toxoplasma*), *Balantidium*, *Cryptosporidium* and others. Possible changes in camel husbandry practices may lead to increase in their prevalence and economic impact. As such, there is need to include these in the overall parasitic disease surveillance among camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, parasitic diseases, clinical aspects, diagnosis, diagnostic techniques, disease prevalence, disease control, disease prevention, epidemiology, blood chemistry, hematology, histology, urine testing, cysts developmental stages, drug therapy, pathogen strains coccidiosis, cryptosporidiosis, neosporosis, protozoal infections, theileriosis, toxoplasmosis, trypanosomiasis, *Balantidium coli*, *Besnoitia*, *Cryptosporidium,Eimeria cameli,Eperythrozoon*, *Haemonchus longistipes*, *Hammondia heydorni*, *Neospora caninum,Sarcocystis cameli*, *Theileria*, *Toxoplasma gondii*, *Tritrichomonas foetus,Trypanosoma evansi*, *Secernentea*, *Strongylida*, antigens, antiprotozoal agents, drugs.

Dia, ML **Parasites of the camel in Burkina Faso.** *Tropical Animal Health and Production.* 2006; 38(1): 17-21. ISSN: 0049-4747
DOI: http://dx.doi.org/10.1007/s11250-006-4303-x
NAL call no : SF601.T7
Abstract: A survey was conducted to determine the prevalence of parasitoses in dromedaries in Burkina Faso. Blood and faecal samples from animals of different ages and both sexes were collected from different villages in Oudalan in April 2004. It was shown that the parasitological and serological prevalences of *Trypanosoma evansi* were 18 and 46%, respectively. *T. brucei* was also detected. Most of the trypanosome-infected animals were from Garagara (37%), Markoye (30%) and Touro villages (11%), with seroprevalences of 81, 50 and 33%, respectively. None of the camels in Esakane had trypanosomes. 15 out of 38 faecal samples were positive for strongyle eggs, with higher rates in Markoye and Esakane. Eggs per g faeces (epg) varied from 0-800 and was highest in Markoye. One animal was positive for *Moniezia* spp. *Hyalomma dromedarii*, *H. marginatum rufipes*, *H. impressum*, *H. truncatum* and *H. impeltatum* were the most commonly isolated ticks in the camels. Alopecia and pruritus in many animals were caused by *Sarcoptes scabiei* var. *cameli*. Reproduced with permission of CAB.
Descriptors: dromedary camels, disease prevalence, disease surveys, epidemiological surveys, epidemiology, geographical variation, parasites, parasitoses, serological surveys, seroprevalence, *Trypanosoma evansi, Moniezia* spp. *Hyalomma dromedarii*, *Hyalomma marginatum rufipes*, *Hylomma impressum*, *Hyalomma truncatum*, *Hyalomma impeltatum,* mange, *Sarcoptes scabiei* var. *cameli*, Burkina Faso.

Gadir, AEA; Khalil, KM; Rahman, MMA; El Rayah, IE; El Malik, KH. **Application of card agglutination test and card indirect-agglutination antigen test for detection of camel trypanosomosis in Western Sudan.** *Journal of Camel Practice and Research.* 2006; 13(1): 41-43. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: A total of 81 blood samples from traditionally managed camels were examined parasitologically and serologically for the presence of camel trypanosomiasis in Northern and

Southern Kordofan States in western Sudan. Parasitological examinations revealed that only 4 cases (4.94%) were positive. Serological investigations showed that 4 and 14 cases (4.94 and 17.28%, respectively) were recorded as ++ and + for Suratex, respectively. The results of CATT indicated that 20, 15, 12 and 13 cases (24.69, 18.52, 14.81 and 16.05%, respectively) reacted as +++, ++, + and +or-, respectively. Four and thirteen cases (4.94 and 16.05%, respectively) were recorded as ++ and + for CIATT, respectively. Suratex, CATT and CIATT were found to be 100% sensitive in the detection of Trypanosoma brucei evansi infection in camel, but high specificity was only recorded for CIATT and Suratex (83.1 and 81.8%, respectively). Reproduced with permission of CAB.
Descriptors: dromedary camels, trypanosomiasis, *Trypanosoma brucei,* agglutination tests, antigens, diagnosis, diagnostic antigens, immunodiagnosis, antigenicity, immunogens, serological diagnosis, Sudan.

Ghulam Muhammad; Abdul Jabbar; Zafar Iqbal; Muhammad Athar; Muhammad Saqib. **A preliminary passive surveillance of clinical diseases of cart pulling camels in Faisalabad metropolis (Pakistan).** *Preventive Veterinary Medicine.* 2006; 76(3/4): 273-279. ISSN: 0167-5877
Abstract: We identified clinical disorders of all 200 city-dwelling cart pulling male camels attending the Veterinary Teaching Hospital, University of Agriculture, Faisalabad, Pakistan during a 7-year period (1993-1999). Data were collected prospectively on a predesigned form and collated. Diagnoses of different diseases/disorders were based on clinical examination supplemented with relevant laboratory tests. A total of 463 entries of 34 different clinical diseases/disorders were recorded. Sarcoptic mange (35% of 200 camels) followed by anhidrosis (23%) and trypanosomosis (19%) were the three most frequently encountered disorders. The body system most often involved was the integument (31%) followed by gastrointestinal (21%), locomotory (12%), thermoregulatory (6%), blood (6%), urogenital (6%), lymphatic (3%), nervous (3%), respiratory (3%) and ocular (3%). Reproduced with permission of CAB.
Descriptors: dromedary camels, draft camels, camel diseases, mange, trypanosomiasis, disease prevalence, disease surveys, epidemiology, *Sarcoptes*, Pakistan.

Gutierrez, Carlos; Corbera, Yuan A; Juste, Maria C; Doreste, Francisco; Morales, Inmaculada. **Clinical, hematological, and biochemical findings in an outbreak of abortion and neonatal mortality associated with *Trypanosoma evansi* infection in dromedary camels.** In: EF Blouin and JC Maillard (Editors). *8th Biennial Conference of the Society for Tropical Veterinary Medicine, Hanoi, Vietnam; June 26-July 01, 2005.* Blackwell Publishing, Oxford. 2006. ISSN: 0077-8923 (print). ISBN: 9781573316378
Descriptors: camels, 16 females, abortions, high neonate deaths, *Trypanosoma evansi* infection, parasitic pathogen, clinical picture, regenerative anemia (hemolytic anemia), lymphocytic and monocytic leukocytosis, hyperproteinemia, hyperglobulinemia, hypoglycemia, serum urea increased, decreased serum iron, uremia, higher protein metabolism.

Gutierrez, C; Corbera, JA; Juste, MC; Doreste, F; Morales, I. **Clinical, hematological, and biochemical findings in an outbreak of abortion and neonatal mortality associated with *Trypanosoma evansi* infection in dromedary camels.** *Annals of the New York Academy of*

Sciences. 2006; 1081: 325-327. ISSN: 0077-8923. Note: In: EF Blouin, JC Maillard (editors) "Impact of Emerging Zoonotic Diseases and Animal Health: 8th Biennial Conference of the Society for Tropical Veterinary Medicine, Hanoi, Vietnam, 26 June-1 July 2005."
Abstract: An outbreak of abortion and high neonatal mortality associated with *Trypanosoma evansi* infection in a camel herd in the Canary Islands, Spain, was investigated [date not given]. 16 pregnant or just-delivered dromedary females (aged 6-12 years) were diagnosed with *T. evansi* infection, 2 of which showed moderate signs of the chronic form, particularly hypoxia and intolerance to exercise. The main laboratory findings were regenerative anaemia (haemolytic anaemia), lymphocytic and monocytic leukocytosis, hyperproteinaemia, hyperglobulinaemia, hypoglycaemia, increased serum urea, and decreased serum iron. The most characteristic finding in the examined females was the presence of uraemia, probably due to higher protein metabolism. The laboratory parameters in all affected camels returned to normal within 3 weeks after trypanocidal (Cymelarsan) [melarsamine hydrochloride] treatment.
Descriptors: female, dromedary camels, infected with *Trypanosoma evansi,* impact of disease, abortion, neonatal mortality, biochemistry, clinical aspects, hematology, hemolytic-anaemia, low iron levels, hyperproteinemia, hypoglycemia, hypoxia, disease outbreaks, outbreaks, antiprotozoal agents, drug therapy, trypanocides, trypanosomiasis, uremia, azotemia, melarsamine hydrochloride.

Hunter, A (Editor). ***La Sante Animale. Volume 2. Principales Maladies. [Animal Health. Volume 2. Principal Diseases.]*** Published by Editions Quae, Versailles. 2006; 310 pp. ISBN: 2759200051; 9782759200054. Note: In French.
Abstract: The first volume of this work considered the fundamentals of animal pathology and the principles of disease control; volume 2 considers the most important diseases of livestock in the tropics and subtropics in more detail. Each disease is described with reference to its symptoms, aetiology, mode of transmission, treatment and prevention. The first part covers infectious and contagious diseases (viral and bacterial diseases, coccidiosis and dermatomycoses) of livestock in general, bovines, small ruminants, camels, equines and pigs. Part 2 covers venereal and congenital infections; part 3 describes arthropod parasites (flies, lice, fleas, ticks and mange mites). Vector-borne diseases of livestock in general, small ruminants and equines are considered in part 4, helminths and helminthoses in part 5, and environmental and other diseases (metabolic disorders, neoplasms, nutritional deficiency and poisoning) in part 6. This book is intended for use by veterinary technicians and agricultural advisors, and as a textbook in higher education. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, horses, pigs, sheep, pigs, livestock animal diseases, bacterial diseases, clinical aspects, coccidiosis, deficiency diseases, animal disease transmission, drug therapy, ectoparasites, helminthes, infectious diseases, metabolic disorders, poisoning, prophylaxis, tropics, vector borne diseases, viral diseases, bacterial infections, bacterioses, chemotherapy, clinical picture, communicable diseases, parasitic worms, toxicosis, tropical countries, viral infections.

Ishag, MY; Majid, AM; Magzoub, AM. **Isolation of a new *Sarcocystis* species from Sudanese camels (*Camelus dromedarius*).** *International Journal of Tropical Medicine.* 2006; 1(4): 167-169. ISSN: 1816-3319

Abstract: Six weaned puppies 4-weeks-old were fed once a composite of raw cameline meat (oesophagus, diaphragm, heart and skeletal muscles) collected from camels slaughtered at El Gedarif city-Eastern Sudan. The puppies started to shed two types of *Sarcocystis* sporocysts 9-13 days after feeding raw meat. One type identified morphologically as *Sarcocystis cameli,* measured 13.2-13.6x6.5-9.5 micro m with a patent period of 55-57 days. The second type had a larger size than the first one (vis *Sarcocystis camelocanis*), measured 16.0x9.9-11.5 micro m and a shorter patent period (37-45 days). The two species which harvested from intestinal mucosae of the infected puppies were orally given to three naive weand calf-camels (1x104 *Sarcocystis* sporocysts for each calf). The calves were medicated with amprolium at 100 gm kg-1 body weight to reduce the acute effects of *Sarcocystis*. Histological findings revealed the presence of two types of *Sarcocystis* tissue cysts; one form had a thin cyst wall (0.5-1 micro m in width), measured 72.5-264x9.9-29.5 micro m, the ground substance extended inwards into the cyst in the form of narrow septae which divided the whole cyst into compartments. The other cyst measured 73-155x23-29.5 micro m, had a thick cyst wall (2-3 micro m in width) which divided the cyst into compartments.
Descriptors: dromedary camels, puppies fed raw meat, infected camel meat, slaughtered camel muscle meat, camel calves, amprolium, body weight, diaphragm, heart, esophagus, raw foods, histology, cyst wall, sporocysts, *Sarcocystis*, Sudan.

Ishag, MY; Magzoub, E; Majid, M. **Detection of *Toxoplasma gondii* tachyzoites in the milk of experimentally infected lactating she-camels.** *Journal of Animal and Veterinary Advances.* 2006; 5(6): 456-458. ISSN: 1680-5593
Abstract: This study was conducted to determine the presence of *Toxoplasma gondii* tachyzoites in the milk of female camels experimentally infected with T. gondii (5x105 oocysts). The milk of *Toxoplasma gondii* infected female camels (n=3) were inoculated intra-peritoneally to 9 albino mice. *Toxoplasma* tachyzoites and cysts were detected in 6 mice that were inoculated with milk from the 2 infected camels. *Toxoplasma* antibodies were detected in the mice sera also. Three experimental mice remained free of infection after inoculation. On the other hand, camel calves remained clinically normal during the experimental period although latex agglutination test revealed the presence of *Toxoplasma* antibodies in their sera at 7-9 days after infection of the dams. The antibody titres of the camel calves ranged from 1/8-1/16. Postmortem examination of all suckling calves revealed enlarged mesentery, and inguinal and subscapular lymph nodes. Petechial haemorrhages were fond in the brain and lungs of the animals. Microscopic examination revealed the presence of *T. gondii* cysts in the brain and tachyzoites in lungs, livers, kidneys and hearts. It is concluded that the number of *Toxoplasma gondii* tachyzoites excreted in the milk of the female camels is low.
Descriptors: dromedary camels, lactating adults, calves, mice, experimental infection, protozoal infections, *Toxoplasma gondii*, toxoplasmosis, sporozoites, camel milk, secretion of tachyzoites in milk, antibodies, developmental stages, disease transmission, food safety, milk hygiene.

Mahran, OM **Some epidemiological and parasitological studies on prevalence of gastrointestinal parasites of dromedary camels at Shalatin Region, Red Sea Governorate, Egypt and trials of treatment.** *Assiut Veterinary Medical Journal*. 2006; 52(111): 149-162. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: A parasitological survey of 530 camels of different ages and sex was carried out in January-December 2005 to investigate the prevalence of gastrointestinal parasites in the Shalatin region, Red Sea Governorate, Egypt. 72.83% of the examined camels were infected. Of the positive cases, 45.66% harboured helminth eggs, 10.94% coccidian oocysts and 16.22% had mixed infections. *Trichostrongylus* sp. was the most common nematode with a prevalence of 35.06%, followed by *Oesophagostomum* sp. (16.15%), *Trichuris* sp. (12.19%), *Haemonchus* sp. (10.67%), *Ostertagia* sp. (8.84%), *Chabertia* sp. (8.53%) and *Strongyloides* sp. (1.82%). Cestode (*Moniezia* sp.) eggs (1.82%) and coccidian oocysts (*Eimeria cameli*, 48.61%; *E. dromedarii*, 27.87%; *E. rajasthani*, 5.6%) were also present. Coproculture produced third stage larvae of *Trichostrongylus*., *Strongyloides*, *Haemonchus* and *Ostertagia* spp. The prevalence of infection was lower in young and higher in older animals. Females were more highly infected than males. The highest rates of infection were observed in winter and spring. Therapeutical trials with different anthelmintic drugs showed that albendazole was the drug of choice for the treatment of camel helminthoses. Reproduced with permission of CAB.
Descriptors: dromedary camels, various ages, females, males, intestinal parasitic nematodes, detection, diagnosis, disease prevalence, disease surveys, epidemiology, helminthoses, mixed infections, nematode control, parasitology, spring, winter, disease surveillance, *Chabertia*, *Haemonchus*, *Ostertagia*, *Trichostrongylus*, *Trichuris*, *Eimeria cameli*, *Moniezia*, Adenophorea, *Enoplida*, gastrointestinal tract, multiple infections, *Secernentea*, *Strongylida*, *Eimeria dromedarii*, *Eimeria rajasthani*, albendazole, Egypt.

Mochabo, MOK; Kitala, PM; Gathura, PB; Ogara, WO; Eregae, EM; Kaitho, TD; Catley, A. **The socio-economic impact of important camel diseases as perceived by a pastoralist community in Kenya.** *Onderstepoort Journal of Veterinary Research.* 2006; 73(4): 269-274. ISSN: 0030-2465

Abstract: The objective of the study was to assess the socioeconomic impact of camel trypanosomiasis (surra) according to the perceptions of the pastoralists community in Kenya. Four livestock grazing units were conveniently selected and in each of them, three groups of key informants comprising five to eight persons were selected for the participatory exercises. Five camel diseases were listed in order of importance according to their severity and frequency of occurrence including trypanosomiasis, mange, non-specific diarrhoea, tick infestations and haemorrhagic septicaemia. The losses listed as incurred due to the five diseases were: losses in milk, meat, blood, fats and hides, dowry payments, depreciation in sale of animals, losses due to infertility and abortions and losses due to the cost of treatment. It was observed that there was good agreement ($P<0.05$) between the informant groups on the losses incurred as a result of the diseases for all the selected loss indicators. Surra and mange were given high median scores on all the indicators while non-specific diarrhoea, tick infestations and haemorrhagic septicaemia received moderate median scores. It is concluded that the camel plays a central role in the lives of Turkana pastoralists and that surra has a devastating social and economic impact. There is a need for veterinary and policy decision-makers to focus more attention on the control of surra in this arid and semi-arid area of Kenya.
Descriptors: dromedary camels, diarrhea, mange, parasitoses, pastoral society, protozoal infections, trypanosomiasis, *Trypanosoma evansi*, diarrhea, parasitic diseases, parasitic infestations, parasitosis, protozoal diseases, scouring, losses, socio-economic aspects, trypanosomosis, Kenya.

Radfar, MH; Maimand, AE; Sharify, A. **A report on parasitic infections in camel (*Camelus dromedarius*) of Kerman slaughterhouse.** *Journal of the Faculty of Veterinary Medicine, University of Tehran.* 2006; 61(2): 165-168. ISSN: 1022-646X. Note: In Persian with an English summary.

Abstract: This study was conducted to determine the prevalence of parasitic infections in camels (*Camelus dromedarius;* n=60) from the Kerman slaughterhouse. The examination of different organs (including alimentary canal, abdominal cavity, liver, lung, kidneys, heart) and blood smear for parasitic infections were done. The parasites in the washed contents of alimentary canal, lung and sliced organ were cleared using lactophenol or stained with carmine acid collected, counted and identified under the microscope. Blood smears were stained with Giemsa stain. Parasites were found on the alimentary tract, liver, lung, nasal cavity and blood of the camels. Eight species of parasites were detected in abomasum (*Haemonchus contortus*; 6.67%), small intestine (*Moniezia expansa,* 5%; *M. benedeni,* 6.67%; *Stilesia globipunctata*, 8.3%), liver (hydatid cyst, 3.3%), lungs (hydatid cyst, 28%; *Dictyocaulus filaria*, 10%), nasal cavity (*Cephalopina titillator* larvae, 63.3%), and blood (*Trypanosoma evansi*, 1.6%). This is the first report of these parasites in camels from Kerman. Reproduced with permission of CAB.

Descriptors: dromedary camels, post slaughter sampling, diseases, abdominal cavity, disease prevalence, epidemiology, hydatids, heart, kidneys, liver, lungs, small intestine, gastrointestinal tract, nasal cavity, *Cephalopina titillator*, *Dictyocaulus filarial*, *Haemonchus contortus*, *Moniezia benedeni*, *Moniezia expansa,Stilesia globipunctata*, *Trypanosoma evansi*, *Secernentea*, *Strongylida*, Kerman.

Sadrebazzaz, A; Haddadzadeh, H; Shayan, P. **Seroprevalence of *Neospora caninum* and *Toxoplasma gondii* in camels (*Camelus dromedarius*) in Mashhad, Iran.** *Parasitology Research*. 2006; 98(6): 600-601, ISSN: 0932-0113

DOI: http://dx.doi.org/10.1007/s00436-005-0118-3

Abstract: One hundred twenty camels were blood-sampled and used to evaluate serological screening for *Neospora caninum* and *Toxoplasma gondii* infection by indirect fluorescent antibody test (IFAT) in Mashhad, Iran, during years 2004-2005. Of the 120 camels, antibodies to *N. caninum* were found in three in titers of 1:20 and in four in titers of 1:40 using whole *N. caninum* tachyzoites as IFAT slide (VMRD Inc., Pullman, WA 99163, USA). Antibodies to *T. gondii* were found in three camels in titers 1:20 and in two camels in titers 1:40 using whole *T. gondii* tachyzoites as IFAT slide (BIOGENE, Iran).

Descriptors: dromedary camels, *Neospora caninum*, *Toxoplasma gondii*, parasites, parasitoses, antibodies, disease prevalence, serological surveys, seroprevalence, Iran.

Saeed, A; Hussain, MM; Gopal Chand; Al Yousuf, RJ. **Gastrointestinal parasites of camels in United Arab Emirates.** *Indian Journal of Animal Sciences.* 2006; 76(8): 612-613. ISSN: 0367-8318

Abstract: This study was conducted to determine the presence of gastrointestinal parasites in camels of different age and sex in United Arab Emirates. The observation of the prevalence of gastrointestinal parasites in 831 camels was conducted between September 2002 and April 2004. Out of the 831 camels examined, 119 were positive for parasitic infections. It was observed that younger animals were significantly more prone to infection than the adults.

Out of 294 males and 537 females examined, 37 (12.58%) and 82 (15.27%) camels were positive for gastrointestinal parasites, respectively. The following parasites were observed: *Haemonchus*, *Nematodirus,Trichostrongylus*, *Trichuris*, *Oesophagostomum*, *Camelostrongylus*, *Moniezia*, *Paramphistomum*, *Eimeria* and *Balantidium* sp. Reproduced with permission of CAB.

Descriptors: dromedary camels, parasitic diseases, gastrointestinal tract parasitoses, age differences, sex differences, *Haemonchus*, *Nematodirus,Trichostrongylus*, *Trichuris*, *Oesophagostomum*, *Camelostrongylus*, *Moniezia*, *Paramphistomum*

Shekarforoush, SS; Shakerian, A; Hasanpoor, MM. **Prevalence of *Sarcocystis* in slaughtered one-humped camels (*Camelus dromedarius*) in Iran.** *Tropical Animal Health and Production.* 2006; 38(4): 301-303. ISSN: 0049-4747

DOI: http://dx.doi.org/10.1007/s11250-006-4362-z

Abstract: Four hundred adult camels (135 females and 265 males) in two age groups (5-10 and >10 years old), originating from several provinces and slaughtered in the Najaf-Abad slaughterhouse, located in central Iran, were randomly selected [date not given]. The tongue, heart, oesophagus and various skeletal muscles (diaphragm and abdominal and intercostal muscles) of each camel were inspected for the presence of sarcocysts. Tissue samples of the heart, tongue, oesophagus, diaphragm and rectus femoris muscle were also collected for microscopic examination. No macroscopic sarcocysts were found in any of the samples. However, Sarcocystis bradyzoites were found in 209 out of the 400 camels (52.3%). The highest infection rate was observed in the heart ($p<0.01$), followed by the oesophagus and rectus femoris muscle. The infection rate also increased significantly with age ($p< 0.01$). However, it was independent of sex, with prevalences of 54.0% in males and 48.9% in females ($p>0.05$). Reproduced with permission of CAB.

Descriptors: dromedary camels, males, females, adult animals, 2 age grouping, differences, *Sarcocystiscameli,* bradyzoites, tissue distribution, disease prevalence, disease surveys, epidemiology, Iran.

2005

Al Jabr, OA; Mohammed, GE; Al Hamdan, BA. **Giardiosis in camels (*Camelus dromedarius*).** *Veterinary Record*. 2005; 157(12): 350-352. ISSN: 0042-4900

URL: http://veterinaryrecord.bvapublications.com

NAL call no: 41.8 V641

Abstract: This short communication describes clinical cases of giardiasis in camels in Saudi Arabia. In March 2005, a three-year-old female camel (*Camelus dromedarius*) was admitted to the Veterinary Teaching Hospital of the King Faisal University, Al-Ahsa, in sternal recumbency and with a 10-day history of severe intermittent diarrhoea. Clinical examination showed that the animal was in poor condition and inappetent. The faeces were watery and malodourous. Haematocrit and total blood haemoglobin level were low, while total leukocyte and monocyte counts were high. Faecal examination revealed the presence of *Giardia* trophozoites. Upon postmortem examination, the gastric region was found necrotic and

covered with fibrinous exudates as a result of acute gastritis. Following this case, camels with giardiasis were presented to the Veterinary Teaching Hospital in increasing frequency. Until April 2005, seven camels with giardiasis had been examined, suffering mainly from diarrhoea with soft or watery faeces. Faecal samples from camels that appeared normal were negative for *Giardia* sp. cysts. A daily dose of 2 g metronidazole was prescribed to the affected camels. However, it was not possible to carry out follow-up clinical observation as the owners of the affected camels would not allow the animals to be hospitalized. To the authors' knowledge, this is the first reported occurrence of *Giardia* sp. infection in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, *Giardia* sp, giardiasis, lesions, case reports, clinical aspects, diagnosis, giardiasis, camel hosts, new host records, Saudi Arabia.

Antoine Moussiaux, N; Faye, B; Vias, GF. **Tuareg ethnodiagnostic skill of camel diseases in Agadez area (Niger).** *Journal of Camel Practice and Research.* 2005; 12(2): 85-93. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: For generations, nomad herders have been learning to manage herd health, particularly in dromedaries, because of their high value. They have thus acquired a very comprehensive knowledge of signs of illness and have developed their own nomenclature. The present study aims at the description, scientific identification and recognition of this ethnoveterinary knowledge by means of an investigation carried out in Tuareg populations living in the neighbourhoods of Agadez (Niger) in November 2003-January 2004. The dominant pathologies cited by herders for being the most alarming are gastrointestinal helminthoses (izni), camel calf diarrhoea (efay), tick infestations of camel calves (igardan), camel pox (erk eshik), sarcoptic mange (ajud) and bronchopneumonia (toza). Poorly identified nosologic entities are also reported. Reproduced with permission of CAB.
Descriptors: dromedary camels, etiology, camel diseases; herd health management, Tuareg nomads, traditional medicine, ethnoveterinary knowledge, diagnosis, diarrhea, helminthoses, helminthes, intestinal worms, parasitoses, pneumonia, scabies, Niger.

Enwezor, FNC; Sackey, AKB. **Camel trypanosomosis - a review.** *Veterinarski Arhiv.* 2005; 75(5): 439-452. ISSN: 0372-5480. Note: In: English with a Croatian summary.
Abstract: Camel trypanosomosis (surra), caused by *Trypanosoma evansi*, is the most important single cause of morbidity and mortality in camels. The disease, transmitted non-cyclically by haematophagus flies (e.g. *Tabanus*) is endemic in Africa, Asia and South America, and in addition to camels other species of domesticated livestock are affected. Because of the wide geographic range of surra, its control has attracted international attention, with a focus on formulating and implementing effective strategies aimed at increasing productivity and achieving a decrease in mortality and morbidity. In this review, the clinicopathological effects of surra are presented, as their understanding may help in the design of effective control. Anaemia appears to be a major component of the pathology of surra. Its development and persistence in the course of the disease induce anoxic conditions which manifest signs of dysfunction in various organs as a result of a fall in tissue pH and vascular damage. This is followed by the release of large quantities of cytoplasmic and mitochondrial enzymes, especially aspartate alanine transferase (AST) and alanine transferase (ALT), among others, into serum, causing further cellular and tissue damage. The net effect associated with

the above changes is immunosuppression which later develops and predisposes the animals to other infections and death if untreated. Therefore, emphasis is placed on accurate diagnosis of surra, treatment with effective trypanocidal drugs such as trypan and the use of vector control methods in the control and management of this disease.
Descriptors: dromedary camels, *Trypanosoma evansi*, trypanosomiasis, etiology, camel pathology, anemia, diagnosis, disease control, disease prevention, disease vectors, immune response, immunological reactions, pathogenesis, reviews, therapy, therapeutics.

Getachew Abebe. **Trypanosomosis in Ethiopia.** *Ethiopian Journal of Biological Sciences*. 2005; 4(1): 75-121. ISSN: 1819-8678. Note: A review article.
Abstract: Tsetse-transmitted trypanosomosis is widely distributed in western and southern lowlands and the river valleys cutting into the central highlands of Ethiopia. Prior to the 1960's, trypanosomosis had relatively little impact on the economy of Ethiopia. There were pockets of human sleeping sickness in the west and domestic livestock, particularly cattle, could not be kept over extensive areas of the lands. However, much of the country is tsetse-free, either because it is north of the main African tsetse belts or because it is too high, hence too cold to support the fly. As of early 1970's the significance of the disease has increased enormously and is still increasing. The loss of fertility of land in the marginal, high temperature, low rainfall northern regions led to the resettlement of the affected rural population and their livestock in more potentially productive areas, many of which are tsetse-infested. Furthermore, the expansion of tsetse population into higher altitude areas brings them into contact with previously unaffected livestock. Considering the agricultural economy of Ethiopia, livestock, cattle in particular, provide meat, milk and manure; also draught oxen are more extensively used in tsetse-free highlands of Ethiopia than anywhere else in sub-Saharan Africa. The introduction of draught oxen into the resettlement areas in the lowlands was severely constrained by the widespread presence of trypanosomosis. Five species of *Glossina* (*G. morsitans submorsitans*, *G. pallidipes*, *G. tachinoides*, *G. fuscipes fuscipes* and *G. longipennis*) have been recorded in Ethiopia but only four are widespread and of significant economic importance. The most important trypanosomes, in terms of economic loss in domestic livestock are tsetse-transmitted species: *Trypanosoma congolense*, *T. vivax* and *T. brucei*. The closely related *T. brucei* subspecies, *T. b. rhodesiense* cause human sleeping sickness. The other trypanosoma species of economic importance are *T. evansi* of camels and *T. equiperdum* of equines. Tsetse control activities against, mainly, *G. m. submorsitans* were undertaken over 4,500 km2 of Didessa Valley as part of the Eastern Africa Regional Programme. Apart from this, operation is underway to eradicate tsetse flies from an area of 25 000 km2 in the southern Rift Valley of Ethiopia using the sterile insect technique. If trypanosomosis could be controlled in Ethiopia, much of the best-watered and most fertile land of the southwest could be utilised. Land suitability studies carried out in areas of low population density in tsetse-infested areas of the country revealed that these areas have the best potential of expanded agriculture, provided that trypanosomosis constraint can be overcome. Reproduced with permission of CAB.
Descriptors: camels, asses, cattle, donkeys, goats, horses, sheep, humans, livestock diseases, etiology, African trypanosomiasis, animal-diseases, diagnosis, diagnostic techniques, disease control, disease transmission, disease vectors, epidemiology, geographical distribution; human diseases, immunological techniques, pathogenesis, vector control, vector borne dis-

eases, *Glossina fuscipes fuscipes*, *Glossina longipennis*, *Glossina morsitans submorsitans*, *Glossina pallidipes*, *Glossina tachinoides*, *Trypanosoma brucei*, *Trypanosoma congolense*, *Trypanosoma equiperdum*, *Trypanosoma evansi*, *Trypanosoma rhodesiense,Trypanosoma vivax*, causal agents, etiology, serological techniques, sleeping sickness, zoonotic infections, zoonoses, Ethiopia, Abyssinia.

Ghulam Muhammad; Khan, MZ; Hussain, MH; Zafar Iqbal; Muhammad Iqbal; Muhammad Athar. **Ethnoveterinary practices of owners of pneumatic-cart pulling camels in Faisalabad City (Pakistan).** *Journal of Ethnopharmacology.* 2005; 97(2): 241-246. ISSN: 0378-8741

Abstract: The present study was planned to investigate the ethnoveterinary methods practiced by the owners of pneumatic-cart pulling camels in Faisalabad Metropolis (Pakistan). During a 7-year-period (November 1992-November 1999), 200 owners of draught camels working in the city were interviewed. Information concerning the ethnoveterinary practices for the treatment of common disorders of digestive tract (indigestion, colic and diarrhea), respiratory tract (cold/rhinitis, pneumonia), skin problems (mange, ulceration of nostrils with or without nasal myiasis, ticks and lice, harness sores), systemic states (fever, anhidrosis) and preventive therapy of indigestion and halitosis was collected through interviews and collated with those documented for the treatment of desert-dwelling camels. Familiarity of owners with two traditional methods of surra (trypanosomiasis) diagnosis ('Sand-ball test' and 'Hair-stick test') known to pastorilists was also probed. In addition, the dose and frequency of use of common salt was investigated. Traditional inputs utilized by the camel owners included various plant products, insecticides, sulphur, sump oil, common salt, aspirin, naphthalene balls and milk fat. Different owners used different combinations of traditional drugs for the treatment of disorders/conditions investigated. None of the camel owners was found familiar with the 'Sand-ball test' or 'Hair-stick test' of trypanosomiasis diagnosis. For the prevention of indigestion and halitosis all camel owners had practiced administration of 'massaulas' (physic drench/balls) along with common salt (average 250 g) on weekly basis. In general, the ethnoveterinary treatment practices used by the owners of city-dwelling camels appear to be different from those documented for the treatment of diseases of desert-dwelling camels.

Descriptors: draft camels in an urban environment, cart pulling camels, working camels, camel diseases, colic, diarrhea, dyspepsia, mange, parasitoses, parasitic infections, pneumonia, respiratory diseases, rhinitis, skin diseases, harness sores, injuries, *Trypanosoma evansi*, trypanosomiasis, myiasis, causal agents, diagnosis, disease prevention, ethnicity folk medicine, traditional medicine, ethnic differences, medicinal plants, plant extracts, aspirin, acetylsalicylic acid, insecticides, milk fat, naphthalene, plant extracts, ethnoveterinary care, salt, elemental sulfur, surveys, Pakistan.

Gutierrez, C; Corbera, JA; Juste, MC; Doreste, F; Morales, I. **An outbreak of abortions and high neonatal mortality associated with *Trypanosoma evansi* infection in dromedary camels in the Canary Islands.** *Veterinary Parasitology*. 2005 June 10; 130(1-2): 163-168. ISSN: 0304-4017

Descriptors: dromedaries, *Trypanosoma evansi*, surra, abortion in camels, chronic trypanosomosis, neonatal mortality, disease outbreaks, clinical examination, animal pathology, drug therapy, trypanocides, Canary Islands.

Hassan, M; Muhammad, G; Gutierrez, C; Iqbal, Z; Shakoor, A; Jabbar, A. **Evaluation of different diagnostic tests for *Trypanosoma evansi* infection among horses and camels in the Punjab Region, Pakistan.** *Journal of Camel Practice and Research.* 2005; 12(2): 95-97. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: Parasitological, serological and biochemical tests were used to determine *Trypanosoma evansi* infection in 170 horses and 150 camels sampled from Punjab region, Pakistan. The micro-Haematocrit Centrifugation Technique was used as gold standard method. Wet blood films, thin stained smears and thick stained smears showed a sensitivity of 0.8 and a specificity of 1. Positive and negative predictive values were 1 and 0.99, respectively. Serology using SuratexReg. showed a sensitivity of 1 and a specificity of 0.99. Positive and negative predictive values were 0.83 and 1, respectively. Biochemical tests showed a very low positive predictive value (around 0.38). None of the equines resulted positive at any method. In contrast, 5 (3.3%) and 6 (4%) camels were positive at parasitological and serological examination, respectively. These results seem to indicate that T. evansi infection has a relatively low prevalence in the Punjab region. Reproduced with permission of CAB.

Descriptors: dromedary camels, horses, diagnosis, diagnostic techniques, serological diagnosis, SuratexReg, immunodiagnosis, trypanosomiasis, *Trypanosoma evansi*, Punjab, Pakistan.

Lejon, V; Claes, F; Verloo, D; Maina, M; Urakawa, T; Majiwa, PAO; Buscher, P. **Recombinant RoTat 1.2 variable surface glycoprotein as antigen for diagnosis of *Trypanosoma evansi* in dromedary camels.** *International Journal for Parasitology.* 2005 Apr 1; 35(4): 455-460. ISSN: 0020-7519

DOI: http://dx.doi.org/10.1016/j.ijpara.2004.12.015

NAL call no: QH547.I55

Abstract: The transcript encoding a predominant *Trypanosoma evansi* variable surface glycoprotein RoTat 1.2 was cloned and expressed as a recombinant protein in *Spodoptera frugiperda* and *Trichoplusia ni* (insect) cells. Its potential as an antigen for specific detection of antibody in serum of dromedary camels affected by surra, was evaluated. In ELISA, the reactivity of the recombinant RoTat 1.2 VSG was similar to that of native RoTat 1.2 VSG. An indirect agglutination reagent was therefore prepared by coupling the recombinant RoTat 1.2 VSG onto latex particles. The performance of the latex agglutination test was evaluated on camel sera, and compared with the performance of CATT/*T. evansi* and LATEX/*T. evansi* tests, using the immune trypanolysis assay with *T. evansi* RoTat 1.2 as a reference test. The relative sensitivity and specificity of the latex coated with recombinant RoTat 1.2 VSG, using a 1:4 serum dilution, were respectively, 89.3 and 99.1%. No differences were observed between the performance of latex coated with recombinant RoTat 1.2 VSG and LATEX/T. evansi or CATT/*T. evansi*. Here, we describe the successful use of the recombinant RoTat 1.2 VSG for detection of specific antibodies induced by *T. evansi* infections.

Descriptors: dromedary camels, *Trypanosoma evansi*, surra disease diagnosis, variant surface glycoproteins, recombinant proteins, recombinant antigens, antibody detection, serodiagnosis, latex agglutination test.

Mottelib, AA; Hosein, HI; Mourad, I; El Sherif, AM; Abo-Zeid, ASI. **Comparative evaluation of various diagnostic techniques for *Trypanosoma evansi* in naturally infected camels.** In: A. Krynski and R. Wrzesien. *Animals and Environment, Volume 2: Proceedings of the XIIth ISAH Congress on Animal Hygiene, Warsaw, Poland, 4-8 September 2005*. Published by BEL Studio sp. z o.o., Warsaw, Poland 2005; 505-507. ISBN: 8389968363
Descriptors: dromedary camels, *Trypanosoma* evansi, detection, diagnosis, diagnostic techniques, comparative study, Egypt.

Njiru, ZK; Constantine, CC; Guya, S; Crowther, J; Kiragu, JM; Thompson, RCA; Davila, AMR. **The use of ITS1 rDNA PCR in detecting pathogenic African trypanosomes.** *Parasitology Research.* 2005; 95(3): 186-192. ISSN: 0932-0113
DOI: http://dx.doi.org/10.1007/s00436-004-1267-5
Abstract: There are 11 different pathogenic trypanosomes in trypanosomiasis endemic regions of Africa. Their detection and characterisation by molecular methods relies on species-specific primers; consequently several PCR tests have to be made on each sample. Primers ITS1 CF and ITS1 BR, previously designed to amplify the internal transcribed spacer (ITS1) of rDNA, have been evaluated for use in a universal diagnostic test for all pathogenic trypanosomes. Blood was collected from 373 cattle and 185 camels. The primers gave constant PCR products with the stocks of each taxon tested. Members of subgenus *Trypanozoon* (*T. brucei brucei*, *T. evansi,* T. *b. rhodesiense* and *T. b. gambiense*) gave a constant product of approximately 480 bp; T. *congolense, savannah* 700 bp, *T. congolense kilifi* 620 bp and *T. congolense forest* 710 bp: *T. simiae* 400 bp, *T. simiae tsavo* 370 bp, *T. godfreyi* 300 bp and *T. vivax* 250 bp. The sensitivity of the test ranged from 10 pg for Trypanozoon, *T. congolense* clade and *T. vivax* to 100 pg for *T. simiae* and *T. godfreyi*. The primers detected cases of multi-taxa samples, although the sensitivity was reduced with an increase in the combinations. A better detection rate of trypanosome DNA was recorded with buffy coats than from direct blood. With the field samples, the diagnostic sensitivity was close to the sensitivity obtained using single reactions with species-specific primers for Trypanozoon 38/40 (95%) and *T. congolense savannah* 30/33 (90.9%) but was lower with *T. vivax* 25/31 (77.4%). The primers offer promise as a routine diagnostic tool through the use of a single PCR; however, further evaluation is recommended. Reproduced with permission of CAB.
Descriptors: cattle and camels, humans, trypanosome pathogen detection, African trypanosomiasis, sleeping sickness, *Trypanosoma brucei*, *Trypanosoma congolense*, *Trypanosoma evansi*, *Trypanosoma gambiense*, *Trypanosoma rhodesiense,Trypanosoma vivax*, diagnosis, diagnostic techniques, disease vectors; DNA, PCR.

Omar, SFA. **Serological diagnosis of *Toxoplasma gondii* and *Neospora caninum* in cows, ewes, she-camels and dogs by Competitive ELISA and Capture ELISA.** *Veterinary Medical Journal Giza.* 2005; 53(2): 625-634. ISSN: 1110-1423. Note: "Proceedings of the 8th Scientific Conference: Biotechnology & Animal Wealth Development, Giza, Egypt. 17-19 April, 2005."
Abstract: A serological examination of farm animals which had history of abortion by competitive ELISA was conducted to determine the prevalence of *Toxoplasma gondii* and *Neospora caninum* in Giza, Egypt. Blood samples were collected from 100 cows, 100 ewes, 50 she-camels and 24 dogs. Results showed that 20, 16 and 8% of cows, ewes and camels were

positive for *N. caninum* antibodies, respectively. 18, 14 and 8% of cows, ewes and camels from healthy farms had antibodies against *N. caninum*, respectively. 20.8% of farm dogs and 12.5% of urban dogs were positive for *N. caninum* antibodies. Seroprevalence was higher in bitches than in male dogs. By capture ELISA, 15, 18 and 10% of cows, ewes and camels were positive for *T. gondii* IgG antibodies, respectively. Moreover, 9, 12 and 8% of cows, ewes and camels were positive for IgM anti-Toxoplasma antibodies, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle,cows, dogs, sheep, ewes, *Neospora caninum*, *Toxoplasma gondii*, abortion, antibodies, serological diagnosis, disease prevalence, disease surveys, IgG, IgM, immunodiagnosis, serological surveys, seroprevalence, sex differences.

Pathak, KML; Narendra Singh. **Animal trypanosomosis.** *Intas Polivet*. 2005; 6(2): 194-199. ISSN: 0972-1738
Abstract: Animal trypanosomiasis or surra caused by *Trypanosoma evansi*, one of the most pathogenic protozoan parasites, is a serious disease of domestic animals in India with threatening economic consequences. The disease is said to have evolved from camels coming in contact with tsetse flies carrying the *T. brucei* group of trypanosomes. The disease occurs throughout the year, mostly in post-rainy season and a number of outbreaks in cattle and buffalo have been recorded after vaccination of RP and FMD. The chief symptoms of surra are intermittent fever, anaemia, loss of weight and oedema of dependent parts. Abortion has also been recorded in buffaloes and donkeys. A variable clinical course makes the diagnosis of *T. evansi* infection difficult as the infected animals often may not display any specific clinical signs. Some sero-diagnostic methods like antigen (Ag) and antibody (Ab) detection have been developed but showed poor results. With the introduction of molecular technology, assays based on the detection of trypanosomal DNA by polymerase chain reaction (PCR) have been developed but these techniques are yet to be standardized through their application on a large number of animals. For the treatment of surra, only one drug, quinapyramine methyl sulphate-chloride, is available in India. However, resistance against this drug has been observed which stresses the need for an effective and safe drug for surra in all animals.
Descriptors: dromedary camel, cattle, goats, horses, sheep, *Trypanosoma evansi*, clinical aspects, diagnosis, diagnostic techniques, disease transmission, drug therapy, epidemiology, immunodiagnosis, immunological techniques, pathogenesis, quinapyramine, reviews, socioeconomics, treatment, trypanosomiasis, chemotherapy, clinical picture, serological diagnosis, serological-techniques, socioeconomic aspects, trypanosomosis.

Radfar, MH. **Treatment of trypanosomosis in a herd of camel.** *Indian Veterinary Journal.* 2005; 82(5): 550-551. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Acute trypanosomiasis caused by Trypanosoma evansi was diagnosed in a herd of camel from southeastern Iran (November 2001) by microscopic examination of Giemsa-stained blood smears. Clinical signs included swelling of the neck and pectoral region, presence of secretions in the eyes and pale mucous membranes. The affected camels were pyrexic, with slight tachypnoea and tachycardia. Haematological examination revealed low haematocrit and leukocytosis. The animals were treated with quinapyramine salts (quinapyra-

mine sulfate+quinapyramine chloride) (Quina Ject, 4.4 mg/kg bw SC) once. All the affected animals recovered 10-15 days after the administration of quinapyramine salts.
Descriptors: dromedary camels, *Trypanosoma evansi*, trypanosomiasis, clinical picture, case reports, diagnosis, drug therapy, quinapyramine, antiprotozoal agents, treatment.

Sopyev, B; Divanov, B; Charyev, C. **Diseases of camels, their preventive maintenance and treatment.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 60-66. ISBN: 1586034731
Descriptors: dromedary camels, Bactrian camels, acaricides, brucellosis, clinical aspects, diagnosis, diminazene, disease prevalence, disease prevention, drug therapy, azidine, berenil, hydatid disease, hydatidosis, echinococcosis, epidemiology, helminthoses, licorice, mange, plague, smallpox, trypanosomiasis, vaccination, *Brucella*, *Cephalopina*, *Echinococcus*, *Glycyrrhiza*, *Sarcoptes scabiei*, *Taenia hydatigena*, *Trypanosoma*, *Yersinia pestis*, Turkmenistan, Central Asia.

2004

Al Ani, Falah Khalil Abdul Razzak (Editors). ***Camel Management and Diseases***. Amman: Dar Ammar Book Pub., c2004. xvi + 455pp. ISBN 9957445006; 9789957445003. Note: With 16 consultant contributors." Includes bibliographical references and index.
NAL call no: SF997.5.C3.A43 2004
Abstract: This is a reference book on camels and includes 30 chapters that deal with the different aspects of camel management and diseases. Most chapters are on the dromedary but there is a chapter on Bactrian camel and one on South American camelids. The book also covers the socio-economics of the camel in nomadic life and the history of the camel in pre-Islamic and in Islamic society, and camel sports. Most of the chapters are devoted to the physiology and diseases of the various body systems, diseases by pathogen type (viral, bacterial, parasitic, and fungal), clinical examination, anaesthesia and surgery, nutrition and digestion, management and husbandry. The text is supported by numerous black and white photographs. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, camel diseases, camel husbandry, camel breeding, camel nutrition, camel physiology, infectious diseases, reproduction, diagnostic techniques, therapy, etc.

Al Goraishy, SAR; Bashtar, AR; Al Rasheid, KAS; Abdel Ghaffar, FA. **Prevalence and ultrastructure of sarcocystis species infecting camels (*Camelus dromedaries*) slaughtered in Riyadh city, Saudi Arabia.** *Saudi Journal of Biological Sciences.* 2004; 11(2): 135-142. ISSN: 1319-562X
Abstract: The prevalence of *Sarcocystis* infection in the camel (*Camelus dromedaries*) was estimated as 64% of 624 slaughtered camels at Riyadh abattoirs (K.S.A.). The infection rate was 63% in the diaphragm, 58% in the oesophagus, 43% in both skeletal muscles and tongue and only 34% in the heart muscles. Only microscopic sarcocysts bounded with thin walled primary cyst wall and measured 240 x 120 mu m were usually observed in the examined histological preparations from all selected organs. The ultrastuctural study showed that the cyst wall had many plaside-like protrusions which were irregularly folded. The protrusions

had external non-branched knob-like elevations and internal fibrillar elements. The ground substance was usually found directly beneath the primary cyst wall and it extended inside the cyst cavity in the form of many septa dividing the interior of the cyst into many compartments containing the parasites (metrocytes and merozoites). Both metrocytes and merozoites were similar in their fine structure to each other and to Apicomplexa. Metrocytes underwent endodyogony producing cyst merozoites. A secondary cyst wall was never observed in the present study.
Descriptors: dromedary camels, *Sarcocystis,* parasite infection, prevalence of parasite, post slaughter testing, histology, Saudi Arabia.

Al Qarawi, AA; Omar, HM; Abdel Rahman, HA; El Mougy, SA; El Belely, MS. **Trypanosomiasis induced infertility in dromedary (*Camelus dromedarius*) bulls: changes in plasma steroids concentration and semen characteristics.** *Animal Reproduction Science*. 2004 Aug; 84(1-2): 73-82. ISSN: 0378-4320
NAL call no .: QP251.A5
Descriptors: dromedary camels, male bulls, case study, trypanosome infection, effects of infection, infertility, plasma steroids concentration, semen characteristics.

Delafosse, A; Doutoum, AA. **Prevalence of *Trypanosoma evansi* infection and associated risk factors in camels in eastern Chad.** *Veterinary Parasitology*. 2004; 119(2/3): 155-164. ISSN: 0304-4017
DOI: http://dx.doi.org/10.1016/j.vetpar.2003.11.010
Abstract: A cross-sectional study was conducted to estimate the prevalence of *Trypanosoma evansi* infection (Surra) in herds of camels from the eastern area of Chad. The risk factors associated with disease were also identified. From August 1997 to April 1998, a random sample of 2831 camels from 136 herds was selected. Blood samples were collected and examined for the presence of T. evansi using an antibody (card agglutination test - CATT/T. evansi) and a parasite detection test (buffy-coat technique - BCT). Standardized questionnaires with information about the host and management practices were collected and evaluated for their association with seroprevalence (model 1) and parasitological prevalence (model 2) as indications of host sensitivity. In both models, risk factors were selected using ordinary logistic regression (OLR) and herd effect was evaluated using a generalized estimating equations (GEE) model. The apparent prevalence was 5.3% using BCT and 30.5% with CATT. Real prevalence was estimated at 16.9%+or-1.4 (alpha =5%). Overall, 27.9% (BCT) and 94.9% (CATT) of the herds had a least one-positive animal. Real herd prevalence was estimated at 42.6+or-8.3% (alpha =5%). Camels of the large transhumants had the highest prevalence (estimated to 30.3%+or-2.5; 62.9+or-12.0 in herds). Risk factors associated with seroprevalence were age, ethnic group, length of seasonal migration and longitude of pasture area in the dry season. Risk factors associated with BCT prevalence were age, length of seasonal migration, longitude of pasture area in the dry season, latitude of pasture area in the rainy season and season of sampling. Reproduced with permission of CAB.
Descriptors: dromedary camels, age, *Trypanosoma evansi,* disease prevalence, epidemiology, risk factors, seroprevalence, Chad.

Doutoum, AA; Mbaindingatoloum, FM; Delafosse, A; Michaux, Y. **Sante des dromadaires au Tchad oriental: epidemiologie de la trypanosomose (Surra).[Camel health in eastern Chad: epidemiology of trypanosomiasis (Surra).]** *Revue Africaine de Sante et de Productions Animales.* 2004; 2(2): 138-143. ISSN: 0851-7002. Note: In French with an English summary.

Abstract: A transversal study using questionnaires was conducted among 138 nomadic and sedentary camel breeders. Blood sampling of 2935 camels (*Camelus dromedarius*) randomly selected in eastern Chad was also carried out. Results showed that the breeders are informed about trypanosomiasis. Some herds may include up to 9 seropositive camels out of 10. The prevalence among one-year-old camel was 15% and the overall prevalence was 20%. Serological prevalence, measured using CATT-Test varied with age and sex: two out of three herds have at least one seropositive animal. This first study was followed by a longitudinal study which showed that trypanosomiasis and diarrhoea in young camels are the most frequent diseases in camel herds. They may cause high economic losses due to the mortality of young and adult camels, still birth, reduced milk production and loss of weight of animals. Mange, haemonchosis and Djiddar, a disease with an unknown aetiology, are also widely common. Reproduced with permission of CAB.

Descriptors: dromedary camels, age differences, sex differences, camel health, camel diseases, disease prevalence, disease surveys, questionnaires, serological surveys, epidemiology, diarrhea, mange, trypanosomiasis, *Trypanosoma evansi,* Chad.

Imai, S; Shinno, T; Ike, K; Morita, T; Selim, HM. **Fourteen morphotypes of *Entodinium ovumrajae* (Ophryoscolecidae, Entodiniomorphida) found in the dromedary camel of Egypt.** *Journal of Eukaryotic Microbiology.* 2004; 51(6): 594-597. ISSN: 1066-5234

Abstracts: During a survey of the ciliate protozoal composition of the stomach contents of nine dromedary camels of Egypt, fourteen morphotypes of *Entodinium ovumrajae*, which has been considered as a species peculiar to camels, were found in six camels. Except for five morphotypes including one originally described as an independent species and its forms, these were newly detected. These morphotypes, divided into three groups, can be identified mainly by the morphology of their ectoplasmic processes. Each camel had on average, about five morphotypes of this species. Reproduced with permisisn of CAB.

Descriptors: dromedary camels, stomachs, rumen protozoa, *Entodinium ovumrajae*, morphology, rumen, Egypt.

Mahran, OM. **Some studies on blood parasites in camels (*Camelus dromedarius*) at Shalatin City, Red Sea Governorate.** *Assiut Veterinary Medical Journal.* 2004; 50(102): 172-184. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: A survey was performed on 450 camels from Shalatin city at different ages and sexes from January to December 2003, to detect the incidence of blood parasites in camels. Out of 450 examined camels, 21.31% were naturally infected with blood parasites. Of these animals, 11.55% were infected with *Trypanosoma evansi*, 6.2% were infected with *Theileria camelensis* and 3.33% were infected with *Dipetalonema evansi* microfilariae. The highest rate of infection of blood parasites in camels was during the summer and the rate of infection was higher among older camels than younger individuals. In addition, the rate of infectivity among females was higher than males. A haemogram revealed macrocytic normochromic

anaemia and disturbances in the leukocyte count.
Descriptors: dromedary camels, age differences, sex differences, blood parasites, infectivity rates, clinical aspects, hematology, hemoglobin, erythrocyte count, leukocyte count, macrocytic anemia, microfilariae, morphology, seasonality, *Dipetalonema evansi*, *Trypanosoma evansi*, *Theileria camelensis,* Shalatin City, Red Sea Governorate.

Narender Singh; Pathak, KML; Rajender Kumar; Chhabra, MB. **Epidemiology and diagnosis of surra (*Trypanosoma evansi*) in camels - a review.** *Journal of Camel Practice and Research.* 2004; 11(1): 51-57. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Trypanosomiasis due to *Trypanosoma evansi* is a major enzootic disease of the dromedary camel. Recent surveys have confirmed the widespread occurrence of the disease within a wide range of climate and vegetation zones in Asia, Middle East, Far East, Central and South America and usually outside the tsetse belt in Africa. Only a few reliable data exist on the distribution and seasonal prevalence of the disease in endemic areas. Reports of over 12 000 cases of surra in India during 1940-42 showed that disease prevalence peaked during the months of the monsoon season. Epidemiological studies in Mauritania by Jacquit et.al. in dromedaries from 3 types of herds revealed infection levels ranging from 4.4-14.9% by blood smear examinations and 11-38% by immunofluorescent complement fixation tests (ICFT). Mean *T. evansi* prevalence ranged from 11.1% by microhaematocrit centrifugation technique to 28.1% using a monoclonal antibody based card latex agglutination test (Suratex) and 37.9% using CATT/*T. evansi.* An epidemiological survey of camel trypanosomiasis conducted for the first time in Morocco in 1997 and 1998 showed that the overall seroprevalence was 14.1% by CATT and 18.2% by Ab-ELISA. Concentration techniques were shown to improve the chances of demonstrating trypanosomes in the blood of infected animals. The most applicable and commonly used technique was the microhaematocrit centrifugation technique (MHCT). Buffy coat technique devised by Murray et.al. further improved this parasitological technique. The MHCT could detect trypanosomes in camel blood 6-10 days earlier than in wet or thick blood films. Inoculation of laboratory rodents with blood from suspected infectious camels was a very sensitive method for detecting low parasitaemia caused by *T. evansi*. The development of an enzyme linked immunosorbent antibody assay (ELISA) by Voller et.al was a major breakthrough for the detection of antibodies in serum by a specific antigen. A highly sensitive and specific PCR-based assay for the detection of *T. evansi* in the blood of different animals was developed as well as the vector. Reproduced with permission of CAB.
Descriptors: dromedary camels, trypanosomiasis, *Trypanosoma evansi,* antibodies, antigens, diagnosis, ELISA, immunofluorescence, diagnostic techniques, blood smears, PCR, diagnostic value, disease prevalence, disease surveys, epidemiology, hematocrit, molecular biology, reviews, Africa, Asia, Central America, India, Mauritania, Middle East, Morocco, South America.

Narender Singh; Pathak, KML; Rajender Kumar. **A comparative evaluation of parasitological, serological and DNA amplification methods for diagnosis of natural *Trypanosoma evansi* infection in camels.** *Veterinary Parasitology.* 2004; 126(4): 365-373. ISSN: 0304-4017

Abstract: A representative number of 217 camels (*Camelus dromedarius*) from different areas of western Rajasthan State, India, were examined from July 2002 to May 2003 for *Trypanosoma evansi* infection. The tests used were parasitological (wet blood film, WBF; stained thin blood smear, TBS), immunodiagnostic (double antibody sandwich enzyme linked immunosorbent assay for antigen detection, Ag-ELISA), and DNA amplification by polymerase chain reaction (PCR). These techniques were compared and the best efficiency was found for the last named (PCR). A prevalence of T. evansi infection was detected in 17.05, 9.67, 4.60 and 4.14% by PCR, Ag-ELISA, TBS and WBF with a sensitivity of 100, 56.75, 27.02 and 24.32%, respectively. PCR revealed a specific 227 bp band in positive samples. The intensity of PCR bands was variable in different test samples depending upon the level of infection in the test samples. The history of intermittent fever, emaciation, oedema, poor body condition significantly correlated with positive serological status in ELISA as well as trypanosome DNA detection by PCR.
Descriptors: dromedary camels, accuracy, *Trypanosoma evansi,* trypanosomiasis, diagnosis, diagnostic techniques, disease prevalence, DNA amplification, ELISA, epidemiology, parasitic infestations, immunodiagnosis, parasitoses, PCR, serology, Rajasthan, India.

Shafqaat Ahmad; Butt, AA; Muhammad, G; Athar, M; Khan, MZ. **Haematobiochemical studies on the haemoparasitized camels.** *International Journal of Agriculture and Biology*. 2004; 6(2): 331-334. ISSN: 1560-8530
URL: http://www.fspublishers.org/
Abstract: A total of 100 camels of either sex, different ages, functional classes and maintained at different localities in and around Faisalabad district (Pakistan) were investigated for serum biochemical and haematological changes owing to haemoparasitism caused by *Trypanosoma evansi* and *Dipetalonema evansi* over a course of one year. The mean total serum proteins in the normal camels were found to be 7.381+or-0.048 g/dl; whereas, the corresponding values in haemoparasitized group was 6.831+or-0.270 g/dl. The haemoparasitic infection had a significant (P<=0.05) effect on the total serum proteins. The mean+or-SE values of serum aspartate aminotransferase (SGOT) in normal and haemoparasitized camels were 51.975+or-3.717 micro /litre and 58.179+or-6.598 micro /litre, respectively. The mean+or-SE values of SGPT in normal and haemoparasitized camels respectively were 14.597+or-1.867 and 18.262+or-2.748 micro /litre. The change in both enzymes was non-significant. The mean values of different haematological parameters viz. Erythrocyte sedimentation rate, haematocrit, haemoglobin, total erythrocytic and total leukocytic counts did not differ significantly between the infected and non-infected camels. A mild eosinophilia (0.53%) was observed in the haemoparasitized camels.
Descriptors: dromedary camels, blood parasite effects, *Dipetalonema evansi, Trypanosoma evansi*, aspartate aminotransferase, eosinophils, erythrocyte count, hematocrit, hematology, hemoglobin, leukocyte count, nematode infections, trypanosomiasis, Pakistan.

Shahardar, RA; Mishra, AK; Rao, JR. **Detection of antibodies against *Trypanosoma evansi* in dromedary camels by ELISA using solubilized antigens.** *Indian Journal of Animal Sciences.* 2004; 74(1): 3-6. ISSN: 0367-8318
Abstract: An ELISA for detection of antibodies against *T. evansi* in dromedary camels using 2 types of solubilized antigens, viz. crude solubilized antigen (CSA) and detergent solubi-

lized antigen (DSA) was standardized using positive and negative control sera (India). The optimum conditions standardized for the test were the following: coating the wells of a micro-ELISA plate with 100 micro l of solubilized antigens (at a concentration of 2 micro g/ml); blocking with 5% skimmed milk powder in PBS-T (200 micro l/well); rabbit anti-camel lg-HRPO conjugate diluted 1:300 to 1:1000 with PBS-T (100 micro l/well); and colour development with freshly prepared substrate solution of OPD (200 micro l/well). After measuring the absorbance value of positive and negative controls, test serum samples with twice the mean absorbance value of negative control sera were taken as positive and those below this value as negative. A total of 180 field collected serum samples of camels were screened with ELISA using CSA and DSA as test antigens, and out of them 112 (62.22%) and 124 (68.88%) were positive for *T. evansi* antibodies, respectively.
Descriptors: dromedary camels, *Trypanosoma evansi*, antibodies, antigens, detection, ELISA, India.

Shahardar, RA; Rao, JR; Mishra, AK. **Detection of antibodies against *Trypanosoma evansi* in camels by DID and CIEP.** *Journal of Veterinary Parasitology*. 2004; 18(1): 69-70. ISSN: 0971-6157
Descriptors: dromedary camels, apparently healthy, surra endemic areas, 107 serum samples, diagnostic techniques, antibody testing, *Trypanosoma evansi*, Ouchterlony's double immunodiffusion (DID), counter immunoelectrophoresis (CIEP) tests, detergent solubilized antigen, Bikaner, Rajasthan, India.

Singh, N; Pathak, KML; Kumar, R. **A comparative evaluation of parasitological, serological and DNA amplification methods for diagnosis of natural *Trypanosoma evansi* infection in camels.** *Veterinary Parasitology.* 2004 Dec 30; 126(4): 365-373. ISSN: 0304-4017
Descriptors: camels, natural infection, trypanosomiasis, *Trypanosoma evansi*, infection, disease diagnosis, diagnostic techniques, parasitemia, serodiagnosis, enzyme linked immunosorbent assay, ELISA, antigen detection, polymerase chain reaction, PCR, disease prevalence, India.

Yadav, SN; Ghorui, SK; Ray, D. **Restriction endonuclease analysis of genomic DNA of isolates of *Trypanosoma evansi*.** *Indian Journal of Animal Sciences.* 2004; 74(5): 466-469
Abstract: The present study was initiated to determine the differences or similarities among isolates of *Trypanosoma evansi* through restriction endonuclease profile. The genomic DNA of T. evansi, isolated from naturally infected buffalo, horse and camel, were analysed. A panel of restriction enzymes (Alu I, Dra I, EcoR I, Hind III, Kpn I, Not I, Pst I, Sal I, Sma I and Taq I) were used for complete digestion of genomic DNA. Agarose gel electrophoresis of digested DNA samples appeared as a continuous smear along the electrophoretic tracks and ethidium bromide staining revealed the complex size of the trypanosome genome. There was no fixed restriction site, but in restriction enzyme Dra I and Alu I at region 1.5 kb and 100 bp, respectively, appeared with background smear of DNA fragments. No heterogeneity in the nuclear DNA restriction endonuclease profile was recorded among the isolates. Reproduced with permission of CAB.
Descriptors: dromedary camels, horses, buffaloes, *Trypanosoma evansi,* DNA, genomes, restriction endonuclease analysis, restriction endonucleases.

Arabian: Reproduction

2008

Amer, H; Moose, A. **Relationship between season of the year, culture medium and in vitro oocyte competence in Dromedary camels.** *Bulgarian Journal of Veterinary Medicine.* 2008; 11(3): 195-204. ISSN: 1311-1477

Abstract: The effect of season and hormones in the culture medium on the competence of camel oocytes to mature in vitro was conducted on 67 ovarian pairs. The ovaries were collected during breeding season (BS; n=24), at early non-breeding season (ENBS; n=20) and at late non-breeding season (LNBS; n=23). The follicles (2-8 mm) were aspirated, then oocytes were qualified into 4 grades: Q1 (very good), Q2 (good), Q3 (bad) and Q4 (very bad). The effect of follicle-stimulating hormone and equine chorionic gonadotropin (0.5 micro g/mL FSH or 10 IU/mL eCG) on cumulus expansion and in vitro maturation of oocytes was assessed. The numbers of healthy follicles were significantly (P<0.01) higher during BS compared to both ENBS and LNBS. The left ovary showed a higher (P<0.01) activity than the right one regarding the number of healthy follicles. The number of Q1 to Q3 oocytes and recovery rate were significantly (P<0.01) higher during BS than NBS at early or late months. A significantly (P<0.01) higher number of Q1 to Q3 oocytes were obtained during the ENBS than in LNBS months. The left ovary had higher (P<0.01) number of Q1 and Q2 oocytes compared to the right one. Only during the BS, oocytes cultured in medium containing eCG exhibited a higher (P<0.05) percentage of expansion and maturation (metaphase-II) rates than the medium containing FSH. In conclusion, dromedary camels showed better ovarian activity and oocyte status during BS compared to NBS, and displayed ovarian activity during early as well as late non-breeding months. Further detailed studies are required to establish the reproductive efficiency of dromedary camels throughout the non-breeding season. Reproduced with permission from CAB.

Descriptors: dromedary camels, breeding season, reproductive efficiencies, in vitro culture media, FSH, oocyte maturation, oocytes, ovarian follicles, ovaries, seasonality, equine chorionic gonadotropin.

Khatir, H.; Anouassi, A. **Preliminary assessment of somatic cell nuclear transfer in the dromedary (*Camelus dromedarius*)** *Theriogenology*. 2008; 70(9): 1471-1477. ISSN: 0093-691X

NAL call no: QP251.A1T5

Descriptors: dromedary camels, females, somatic cloning for expansion/maintenance of population, high milk production females, best racing animals, embryonic/somatic nuclear transfer, invitro matured oocytes, somatic cells form adult fibroblasts or granulose cells, karyoplasts, transfer did result in pregnancies, pregnancies lost between 25 and 60days.

Medan, MS; Absy,G; Zeidan, AE; Khalil, MH; Khalifa, HH; Abdel Salaam, AM; Abdel Khalek, TM. **Survival and fertility rate of cooled dromedary camel spermatozoa supplemented with catalase enzyme.** *Journal of Reproduction and Development.* 2008; 54(1): 84-89. ISSN: 0916-

8818
URL: http://reproduction.jp/
Abstract: The study was conducted to determine the effects of addition of different concentrations of catalase enzyme (0, 250, 500 and 1000 IU/ml) to cooled dromedary camel semen extended with tris-yolk-fructose extender on semen quality during storage at 5 degrees C for five days. Conception rates of female camels artificially inseminated with whole fresh or extended cooled dromedary camel semen with or without 500 IU/ml catalase enzyme were also analysed. Results revealed that addition of catalase enzyme at concentrations of 250 or 500 IU/ml to extended cooled dromedary camel semen significantly increased (P<0.01) the percentage of sperm motility and significantly decreased (P<0.01) the percentages of dead spermatozoa, sperm abnormalities and acrosomal damage. The highest (P<0.01) percentage of sperm motility was observed with extended cooled dromedary camel semen supplemented with catalase enzyme at a concentration of 500 IU/ml, and the lowest (P<0.01) value was recorded with catalase enzyme at a concentration of 1000 IU/ml. On the other hand, the lowest (P<0.01) percentages of dead spermatozoa, sperm abnormalities and acrosomal damage of spermatozoa were recorded with extended cooled dromedary camel semen supplemented with 500 IU/ml, and the highest (P<0.01) values were recorded with catalase enzyme at a concentration of 1000 IU/ml. Advancement of the storage time at 5 degrees C significantly decreased (P<0.01) the percentage of sperm motility and significantly increased (P<0.01) the percentages of dead spermatozoa, sperm abnormalities and acrosomal damage. Moreover, the conception rates of female camels artificially inseminated with whole fresh, extended cooled dromedary camel semen free-catalase enzyme and extended cooled dromedary camel semen supplemented with catalase enzyme at a concentration of 500 IU/ml were 46.15, 22.22 and 37.50%, respectively. It is concluded that addition of catalase enzyme at a concentration of 500 IU/ml to semen extender can be used as an agent for prolongation of dromedary camel sperm cell survival during storage at 5 degrees C.
Descriptors: dromedary camels, spermatozoa, acrosome, catalase, conception rate, cryopreservation, enzymes, fertility, semen characters, semen preservation, semen diluent additives, semen diluents, preservation, survival, sperm motility, sperm viability.

Sumant Vyas; Raghvendra Singh; Purohit, GN; Pareek, PK; Sahani, MS. **Ultrasound evaluation of ovarian response to photoperiodic control measures in *Camelus dromedarius*.** *Veterinarski Arhiv.* 2008; 78(1): 39-48. ISSN: 0372-5480. Note: In English with a Croatian summary.
URL: http://www.vef.hr/vetarhiv
Abstract: This study was conducted to determine effect of mask on eyes as a photoperiodic control measure for folliculogenesis in female camels using ultrasound scanner, and analyse the blood progesterone in monitoring the ovarian changes in camels. 14 female camels, 7-11 years old, were used in the study. Seven camels were subjected to the effect of a mask over the eyes (for six hours daily) as a photoperiodic control measure on ovarian activity, while the remaining seven served as the controls. The ovaries were examined by ultrasound at weekly intervals for seven weeks during the non-breeding season. Camels were mated with virile stud when a follicle (>=0.9 cm diameter, ovulating size) was visible on either ovaries. Ovaries were monitored for ovulation up to 48 h post-mating by ultrasound at 12 h intervals and at 20, 30 and 40 days post-mating to ensure pregnancy. A commercial RIA kit was used to

measure serum progesterone on blood samples obtained at days 0, 7, 15, 30 and 45 after mating. Results revealed that there were no follicles observed in camels before treatment and in treated (masked) or untreated camels during the first week of treatment. At week three, all camels in the treatment group had measurable small follicles (0.5-0.89 cm, 6/7) or had follicles of ovulating size (>=0.9 cm, 1/7). Follicles of ovulating size were observed in 28.6, 14.3, 14.3 and 14.3% camels after weeks 4, 5, 6 and 7 of treatment. 50% (3/6) of the camels became pregnant. The serum plasma progesterone level increased after ovulation and remained higher than 1.0 ng/ml in pregnant camels. In the control group, one camel had a follicle (0.6 cm diameter) at week 5 after treatment, but it did not reach ovulating size. It is suggested that protecting the eyes from the sunlight one or two months before the breeding season stimulates follicular growth in camels and pregnancy can occur in these camels when mated. Reproduced with permission of CAB.
Descriptors: dromedary camels, pregnancy, gestation, photoperiodism, eyes, breeding season, ovaries, oogenesis, ovarian follicles, ovulation, progesterone, ultrasound.

Tajik, P; Lamsoo, MRHN. **Assessment of epididymal sperm obtained from dromedary camel.** *Iranian Journal of Veterinary Research*. 2008; 9(1): 46-50. ISSN: 1728-1997. Note: In English with a Persian summary.
URL: http://www.shirazu.ac.ir/en/index.php?page_id=60
Abstract: Testicles were isolated from dromedary camels from a local slaughterhouse during the breeding and non-breeding seasons. Sperms were recovered from different parts of the epididymis (caput, corpus and cauda) and were stained, dried and examined under a light microscope for the proportion of live sperms and sperms with cytoplasmic droplets. The proportions of live sperm cells were 76.8, 86.9 and 88.8% for caput, corpus and cauda epididymis, respectively. In the left testicle, these values were 85.3, 83.1 and 88.4 for caput, corpus and cauda epididymis, respectively. No significant difference was observed in the live sperm cells obtained from the right and left testicles. The proportions of live sperm cells were 83, 90 and 86% during the breeding and 80, 82 and 90.5% during the non-breeding seasons for caput, corpus and cauda epididymis, respectively. The proportions of live sperms with protoplasmic droplets were 66, 70 and 74% during the breeding and 73, 70 and 82% during the non-breeding season for caput, corpus and cauda epididymis, respectively. The proportions of live sperms with protoplasmic droplets were not significantly different between the right and left testicles or among the different parts of the epididymis. It is concluded that sperm cells can be obtained from any part of the epididymis. Reproduced with permission of CAB.
Descriptors: dromedary camels, sperm, breeding season, epididymis, spermatozoa, testes, testicles, post slaughter tissues.

Wani, NA. **Development of camel (*Camelus dromedarius*) oocytes after chemical activation.** *Reproduction Fertility and Development*. 2008; 20(1): 197. ISSN: 1031-3613. Note: "Annual Conference of the International Embryo Transfer Society, Denver, CO, USA; January 05-09, 2008."
URL: http://www.publish.csiro.au/?nid=44

Descriptors: camel oocytes, development invitro, invitro maturation, chemical activation, cloning techniques.

Wani, NA. **Chemical activation of in vitro matured dromedary camel (*Camelus dromedarius*) oocytes: Optimization of protocols**. *Theriogenology*. 2008 Mar 15; 69(5): 591-602. ISSN: 0093-691X
DOI: http://dx.doi.org/10.1016/j.theriogenology.2007.11.011
NAL call no: QP251.A1T5
Abstract: Experiments were conducted to study the efficiency of sequential treatments of ionomycine and ethanol combined with phosphorylation inhibitor (6-dimethylaminopurine) or the specific maturation promoting factor inhibitor (roscovitine) in inducing artificial activation in dromedary M-II oocytes. Cumulus oocyte complexes (COCs), collected from slaughterhouse ovaries were cultured at 38.5pC in an atmosphere of 5% CO in air for 24-48h. In experiment 1, the COCs were either fertilized in vitro or activated with 5oM ionomycine for 5min or 7% ethanol for 7min, both followed by exposure to 6-diethylaminopurine or roscovitine for 4h. After 14-15h of in vitro culture, the oocytes were fixed and stained with 1% aceto-orcein to evaluate their nuclear status. In experiment 2, the oocytes were activated in the same manner as in experiment 1 but were cultured for 7 days to evaluate their post-parthenogenetic development. In experiment 3, oocytes were exposed to the ionomycine for 2, 3, 4 or 5min to evaluate the better exposure time while as in experiment 4, the oocytes matured for 28-48h were activated to see the effect of aging on post-parthenogenetic development. Higher proportion (P <0.01) of oocytes was activated in ionomycine/6-DMAP and ionomycine/roscovitine groups when compared with ethanol/6-DMAP, ethanol/roscovitine and in vitro fertilized groups. However, there was no difference (P >0.05) in the proportion of oocytes activated with ethanol when compared with in vitro fertilized group. No significant difference was seen on the proportion of morula on day 7 of culture, however the development to blastocyst stage was higher (P <0.01) in ionomycine/6-DMAP and ionomycine/roscovitine when compared with ethanol/6-DMAP and ethanol/roscovitine treated oocytes. A higher proportion of oocytes reached blastocyst stage when they were exposed to ionomycine for 3min but they were not significantly different from the others (P >0.05). The proportion of blastocysts obtained was higher (P <0.05) in oocytes activated after 28h of maturation when compared with oocytes activated after 32, 36, 40, 44 and 48h of maturation. In conclusion, a protocol for chemical activation of dromedary camel oocytes with ionomycine/6-DMAP is demonstrated and optimized in the present study for further use in the development of assisted reproductive techniques in this species.
Descriptors: dromedary camel, assisted reproduction techniques, oocytes, protocol developed, chemical activation, ionomycine/6-DMAP.

Wani, A; Billah, M; Skidmore, JA. **Studies on liquefaction and storage of ejaculated dromedary camel (*Camelus dromedarius*) semen.** *Animal Reproduction Science*. 2008; 109(1-4): 309-318. ISSN: 0378-4320
Descriptors: camel; semen storage research; liquefaction; quality of ejaculated semen; storage; effects of different extenders; room (23 degrees C); refrigeration (4 degrees C), I) treatments: (1) tris-tes egg yolk, (2) tris-lactose egg yolk, (3) citrate egg yolk, (4) sucrose egg

yolk and (5) tris-fructose egg yolk; sperm concentration; sperm motility; sperm viability; morphology; viscosity; artificial vagina; treatment comparisons.

Zeidan, AEB; El Baz, MM; Ahmadi, EA; El Aziz, NAA; El Salaam, AMA. **Use of hypoosmotic swelling test for evaluating camel spermatozoal membrane integrity in relation to different solutions.** *Veterinary Medical Journal Giza*. 2008; 56(1): 109-122. ISSN: 1110-1423. Note: In English with an Arabic summary.

Abstract: Five male camels at 5 to 10 years of age and 400-600 kg body weight, were used in the present study. Semen was collected, evaluated, pooled and extended with seven different hypoosmotic solutions (glucose-yolk-citrate: GYC, fructose-yolk-citrate: FYC, lactose-yolk-citrate: LYC, sucrose-yolk-citrate: SYC, tris-yolk-fructose: TYF, skim-cow-milk: SCM and skim camel-milk: SLM) at a level of 100 mOsmol/L and then incubated at 37 degrees C for up to 60 minutes. After each incubation time (0, 5, 15, 30 and 60 minutes), the percentages of sperm motility, spermatozoa with intact acrosome, spermatozoa with coiled tails and swollen spermatozoa, were estimated. The results showed that, the extended camel semen with FYC, SYC, TYF and SCM solutions at a level of 100 mOsmol/L, during an incubation of 37 degrees C for up to 60 minutes increased significantly (P<0.01) the percentage of sperm motility, spermatozoa with intact acrosome and swollen spermatozoa as compared to GYC, LYC and SLM solutions, however, the percentage of spermatozoa with coiled tails decreased significantly (P<0.01) in the extended camel semen with SYC and TYF solutions as compared to GYC, FYC, LYC, SCM and SLM solutions. The advancement of incubation time at 37 degrees C for up to 60 minutes with the all different solutions (GYC, FYC, SYC, LYC, TYF, SCM and SLM) at 100 mOsmol/L decreased significantly (P<0.01) the percentages of sperm motility and percentage of spermatozoa with intact acrosome, while was increased significantly (P<0.01) the percentage of swollen spermatozoa and spermatozoa with coiled tails. The maximum reactivity of the extended camel spermatozoa with the all different solutions to hypoosmotic swelling-test (HOS-test) was reached significantly (P<0.01) at 30 minutes of incubation at 37 degrees C.

Descriptors: dromedarycamels, males, reproduction disorders, male infertility, semen, spermatozoa, motility, diagnostic methods, hypoosmotic swelling test, diagnosis, diagnostic techniques, infertility, methodology.

Zia Ur Rahman, D; Bukhari, SA; Ahmad, N; Akhtar, N; Ijaz, A; Yousaf, MS; Haq, IU. **Dynamics of follicular fluid in one-humped camel (*Camelus dromedarius*).** *Reproduction in Domestic Animals.* 2008; 43(6): 664-671. ISSN: 0936-6768

NAL call no: SF105.A1Z8

Descriptors: dromedary camels, healthy adult females, differences between small and large ovarian follicular fluid, serum sampling, biochemistry, hormones, electrolytes, amino acid profiles, glucose, cholesterol, triglycerides, high-density lipoproteins, urea, total proteins, albumin, globulin, fibrinogen, alanine aminotransferase, aspartate aminotransferase, triiodothyronine, estradiol, 17- beta, progesterone, phosphorus, potassium, leucine, arginine.

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Abdoon, ASS; Kandil, OM; Berisha, B; Kliem, H; Schams, D. **Morphology of dromedary camel oocytes and their ability to spontaneous and chemical parthenogenetic activation.** *Reproduction in Domestic Animals.* 2007 Feb; 42(1): 88-93. ISSN: 0936-6768

DOI: http://dx.doi.org/10.1111/j.1439-0531.2006.00737.x

NAL call no: SF105.A1Z8

Abstract: The present work was conducted to examine (1) the morphology of dromedary cumulus-oocytes complexes (COCs), (2) to study the incidence of spontaneous development of oocytes in vivo and (3) to assess the ability of in vitro matured dromedary oocytes to chemical parthenogenetic activation compared with in vitro fertilized (IVF) oocytes. COCs were recovered from dromedary ovaries classified according to their morphology into six categories. Oocyte diameter was measured using eye piece micrometer. For chemical activation, COCs with at least three layers of cumulus-cells were in vitro matured (IVM) in TCM 199 + 10 (So(Bg/ml FSH + 10 IU hCG/ml + 10% FCS + 50 (So(Bg/ml gentamycin. COCs were incubated for 40 h at 38.5degrees C under 5% CO subscript 2(B in humidified air. After IVM, matured oocytes with first polar body (first Pb) were divided into two groups. Group 1: activated in 7% ethanol (E) for 5 min followed by culture in 2 mM 6-dimethylaminopurin (6-DMAP, E D, subgroup 1) or 10 (So(Bg/ml cycloheximide (CHX, E CHX, subgroup 2) for 3.5 h at 38.5degrees C under 5% CO subscript 2(B. In group 2, oocytes were activated using 50 (So(BM Ca A23187 (Ca A) for 5 min followed by culture in 2 mM 6-DMAP (Ca D, subgroup 3) or 10 (So(Bg/ml CHX(Ca CHX, subgroup 4) for 3.5 h at 38.5degrees C under 5% CO subscript 2(B. For control group, IVM oocytes were fertilized using frozen-thawed camel spermatozoa separated by swim-up method then suspended in Fert-TALP medium supplemented with 6 mg/ml BSA (FAF) + 10 (So(Bg/ml heparin. In all groups, oocytes were in vitro cultured in SOFaa medium + 5% FCS and 5 (So(Bg/ml insulin + 50 (So(Bg/ml gentamycin. Cleavage rate and embryo development were checked on Days 2, 5 and 8. An average of 11.3 +/- 0.3 COCs were recovered/dromedary ovary. Categories 1 and 2 represented 33.1% and 34.8%, respectively, and were significantly higher ($p < 0.01$) than the other categories (19.1, 9.2 and 2.6% for categories 3-5, respectively). Category 6 (embryo-like structures) represented 1.2% of the recovered oocytes, staining of these embryo-like structures with orcien dye indicated the presence of divided cells with condensed nuclei. Dromedary oocytes averaged 166.2 +/- 2.6 (So(Bm in diameter with black cytoplasm. Chemical activation of IVM dromedary oocyte with first Pb in 7% ethanol or 50 (So(BM Ca A followed by culture in 2 mM 6-DMAP showed significantly higher ($p < 0.01$) cleavage and developmental rates to the morula stage than oocytes activated using 7% ethanol or 50 (So(BM Ca A followed by 10 (So(Bg/ml CHX or in vitro fertilized control group. Higher ($p < 0.01$) proportion of oocytes sequentially cultured in 10 (So(Bg/ml CHX or that in vitro fertilized were arrested at the 2-4-cell stage compared with that cultured in 6-DMAP.

Descriptors: dromedary camels, oocytes,cumulus oocytes complexes, morphology, incidence of spontaneous development in vivo, chemical parthenogenetic activation, chemical exposure process.

Ali, S; Ahmad, N; Akhtar, N; Rahman, Z; Sarwar, M. **Effect of season and age on the ovarian size and activity of one-humped camel (*Camelus dromedarius*).** *Asian Australasian Journal of Animal Sciences.* 2007; 20(9): 1361-1366. ISSN: 1011-2367

URL: http://www.ajas.info

Abstract: The ovarian size and activity during the peak (November-April) and the low (May-October) breeding seasons in young and adult camels were studied. Ovaries of 92 camels (*Camelus dromedarius*) with clinically normal reproductive tracts, aged 3-15 years old, slaughtered at Faisalabad or Lahore abattoirs over a period of 24 months were collected. Jugular blood was collected from each animal before slaughter, and the serum was separated and analysed for estradiol concentration. The size (length, width and thickness) and weight of each ovary were measured. Grossly observable Graafian follicles were counted and their diameter was measured using Vernier Calipers. The camels having ovaries presenting follicles >5 mm in diameter were taken as having active ovaries. Results showed that ovarian length, width and weight were significantly higher ($p<0.05$) during the peak than the low breeding season. The percentage of active ovaries was also significantly higher ($p<0.01$) during the peak than the low breeding season. However, the effect of season on ovarian thickness was non-significant. Similarly, the ovarian length, width, thickness, weight and activity did not vary significantly between young (3-7 years old) and adult (8-15 years old) animals. Serum estradiol concentrations were significantly higher ($p<0.05$) during the peak (67.70+or-1.36 pg/ml) than the low breeding season (15.25+or-1.54 pg/ml). It is concluded that Pakistan camels ovarian size and activity are higher during the peak than the low breeding season. However, age of the camel (3 to 15 years old) has no effect on these parameters. Reproduced with permission of CAB.

Descriptors: dromedary camels, age differences, breeding season, estradiol, Graafian follicles; ovarian follicles, ovaries, ovulation, seasonal variation, seasonal changes, seasonal fluctuations, Pakistan.

Aminu Deen. **Artificial insemination in camel is not successful.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 97-102.

Abstract: Camel semen is thick, frothy and gel like in consistency. It is off white to sparkling white in colour. Qualitative laboratory evaluation of camel semen is difficult and certain evaluation tests are merely impossible. Camel semen does not exhibit mass motility due to entrapment of spermatozoa. It does not mix with physiological buffers and egg yolk based tris buffer extenders. If semen extender is added in a collection tube containing freshly ejaculated camel semen, it rises up and shuffles to lie on top of the semen extender, which occupies bottom part and two remain non-miscible. After few hours of storage, the semen, which initially floated on to top of the tube on addition of semen extender, now settles down in the bottom of the tube, while, extender which was settled initially in the bottom of the tube, now rises above the semen. On the top, a thin clear transparent layer of fluid is observed. Qualitative laboratory analysis of mass activity, individual sperm motility and sperm concentrations are not only difficult, but also impossible to a great extent because spermatozoa in camel semen are entrapped into discrete packets. Since the entrapped spermatozoa cannot move, camel semen does not exhibit mass activity. The entrapped camel spermatozoa are released slowly by an unknown mechanism. The rate of release of sperma-

tozoa is too slow; hence individual sperm motility evaluation can also be possible on a small fraction of total sperm contents. Packets containing spermatozoa, when get emptied of it, are converted into an empty vacuole like structure. Microscopic structure of discrete packaging units of entrapped spermatozoa itself is self explanatory that sperm concentration by haemocytometric method is not possible as spermatozoa are neither separated to enable their counting, nor a uniform distribution on dilution can be ensured. No adverse effect of rubber funnel on the spermatozoa was observed. Refrigeration and cryopreservation of camel semen has been successful to preserve viability of spermatozoa to a variable extent. Studies conducted have revealed that artificial insemination is not successful in the camel. Reproduced with permission of CAB.
Descriptors: dromedary camels, artificial insemination, semen characteristics, semen, motility, semen preservation, tris buffers, semen diluent additives, cryopreservation, frozen semen.

Khatir, H; Anouassi, A; Tibary, A. **Effect of follicular size on in vitro developmental competence of oocytes and viability of embryos after transfer in the dromedary (*Camelus dromedarius*).** *Animal Reproduction Science.* 2007 June; 99(3-4): 413-420. ISSN: 0378-4320
DOI: http://dx.doi.org/10.1016/j.anireprosci.2006.06.015
NAL call no: QP251.A5
Abstract: The aim of this work was to determine the effect of follicle size on camel oocyte quality as measured by developmental competence in vitro and in vivo. Ovaries from a local slaughterhouse were dissected to obtain two classes of follicle size: small (3-6 mm) and large (>6 mm) follicles. Quality of the oocytes was assessed after in vitro maturation (IVM), in vitro fertilization (IVF) and in vitro culture (IVC) of cumulus oocyte complexes (COCs). All cultures were done in four replicates at 38.5 degrees C, under 5% CO< sub>2</ sub> and high humidity (>95%). Only COCs with cumulus and homogenous (dark) cytoplasm were used. The COCs were matured for 28 h in TCM-199 medium supplemented with 10% heat-treated fetal calf serum (FCS), 10 ng/mL EGF, and 250 micro M cysteamine. Nuclear maturation rate for each class of follicle size was determined by contrast phase microscopy in a sample of COCs (n=30) denuded, fixed and stained with aceto-orcein. In vitro fertilization was performed using fresh semen (0.5x106 spermatozoa/mL in modified TALP-solution). Fertilized oocytes were cultured in mKSOMaa, under 5% O< sub>2</ sub> and 90% N< sub>2</ sub>. The percentage of COCs reaching metaphase II (MII) after 28 h of maturation was 87% (26/30) and 73% (22/30) for oocytes originating from large and small follicles, respectively (P>0.1). The rate of total cleavage (two cells to blastocyst stage) was greater (P<0.05) for oocytes originating from large follicles (72%; 116/162) than for those derived from small follicles (59%; 140/237). The percentage of fertilized oocytes reaching the blastocyst stage was 35% (57/162) and 20% (48/237) for oocytes collected from large and small follicles, respectively (P<0.05). The viability of in vitro-produced hatched blastocyst from the two groups (15 from 3 to 6 mm follicle size and 22 from follicles >6 mm) was assessed by transfer to synchronized recipients. None of the hatched blastocysts from small follicles resulted in a pregnancy whereas 68% (15/22) of the transferred hatched embryos from large follicles developed into a 25-day pregnancy. Of the resulting 15 pregnancies, 53% (n=8) aborted (five between 2 and 4 months and three between 5 and 7 months of pregnancy). The remaining seven pregnant females gave birth to normal healthy offsprings (four females and three males). The present study shows that dromedary oocytes developmental competence is

acquired late during the final phase of follicular development and this developmental ability translates into greater pregnancy rates after transfer of in vitro produced hatched blastocysts. Reproduced with permission of CAB.

Descriptors: dromedary camels, animal reproduction, animal breeding, embryo transfer, in vitro fertilization, ovarian follicles, follicular development, morphogenesis, dimensions, temporal variation, oocytes, animal embryos, viability, embryo culture, blastocyst, meiosis, in vivo studies, embryogenesis, pregnancy rate.

Khatir, H; Anouassi, A; Tibary, A. **Quality and developmental ability of dromedary (*Camelus dromedarius*) embryos obtained by IVM**. *Reproduction in Domestic Animals.* 2007 June; 42(3): 263-270. ISSN: 0936-6768

DOI: http://dx.doi.org/10.1111/j.1439-0531.2006.00775.x

NAL call no: SF105.A1Z8

Abstract: The effect of source of cumulus-oocytes-complexes (COCs), maturation and fertilization conditions on developmental competence of dromedary embryos was examined. Thirty-six adult females were superovulated with equine Chorionic Gonadotropin (eCG) injection (3500 IU, IM) and divided in three groups of 12 females each. Group 1 provided 138 COC's collected from follicles >= 5 mm 10 days after stimulation prior hCG treatment and matured in vitro for 30 h. Group 2 provided 120 in vivo matured oocytes which were aspirated from their follicles 20 h after hCG (3000 IU, IV) given on day 10 follow eCG injection. Group 3 provided 65 in vivo matured/fertilized oocytes. Females in Group 3 received hCG on day 10 following eCG treatment and then were mated 24 h later. Fertilized oocytes were collected from the oviducts of females 48-h post-mating. Quality of the oocytes was assessed after in vitro maturation (IVM), in vitro fertilization (IVF) and in vitro culture (IVC) of COCs. All cultures were performed in three replicates (n = 3) at 38.5pC, under 5% CO and high humidity (>95%). Only COCs with cumulus and homogenous (dark) cytoplasm were used. Nuclear maturation rate for Groups 1 and 2 was determined by epifluorescence microscopy in a sample of COCs (n = 30) denuded, fixed and stained with Hoechst 33342. To study the viability of obtained embryos, hatched blastocysts from each group were transferred to recipients followed by pregnancy diagnosis using ultrasonography at 15, 60 and 90 days. The percentage of COCs reaching metaphase II (MII) after 30 h of maturation was slightly but not significantly higher for in vivo matured oocytes (28/30; 93%) than those in vitro matured (25/30; 84%). The total rate of cleavage (2 cells to blastocyst stage) was not different for the three groups. However, significantly ($p < 0.05$) more blastocyst and hatched blastocysts were obtained from in vivo matured and in vivo fertilized oocytes (Group 3; 52% and 73%) than from in vitro fertilized oocytes whether they were matured in vitro (Group 1; 35% and 32%) or in vivo (Group 2; 32% and 45%). Pregnancy rates were not significantly different amongst all groups for the three first months following embryo transfer. All pregnancies were lost after day 90 follow transfer except for in vivo matured and in vivo matured/fertilized groups. Only in vivo matured/in vitro fertilized and in vivo matured/fertilized produced embryos continued normal development until term and resulted in the birth of normal and healthy live calves. Six claves (29%; 6/21) were born from Group 3 and one (8%; 1/13) calf was born from Group 2. This study shows that the IVC system used is able to support camel embryo development. However, developmental competence and viability of dromedary embryos may be directly related to the intrinsic quality

(cytoplasmic maturation) of oocytes.
Descriptors: dromedary, source of cumulus-oocytes-complexes (COCs), maturation conditions, fertilization conditions, developmental competence, invitro matured/invitro fertilized and invivo matured/fertilized, embryo production, development, pregnancy,

Marai, IFM; Zeidan, AEB. **Artificial insemination in Camelidae.** *Tropical and Subtropical Agroecosystems.* 2007; 7(1): 1-13. Note: In English with a Spanish summary. A review article.
URL: http://www.veterinaria.uady.mx/publicaciones/journal/2007-1/128-camels2.pdf
Abstract: The most important problems of Artificial Insemination (AI) in Camelidae is its timing in relation to ovulation in the she-camel. The present article reviewed collection of semen, processing of semen, manipulation of the female and semen deposition technique in Camelidae species. Commonly, semen is collected by electroejaculation, artificial vagina (AV), flushing of the epididymus with saline solution, while the more accepted methods are the former two methods. Semen is usually used in raw condition or after extension, depending on the method of semen processing. In the fresh raw method, whole semen is used within minutes or after few hours. Extension of the semen ejaculate is carried out by adding extenders and it is required in more efficient use of AI, in short-term preservation or liquid semen (within a few hours or days) and long-term preservation or frozen semen (months or years). In short-term preservation, semen is used extended under different temperatures (30, 25 or 4 degrees C). Long-term preservation is carried out by cryopreservation. Packaging methods such as pellets, ampoules or in plastic straws with different volumes (0.25, 0.5 or 4 ml) represent different freezing procedures. The quality and survival of spermatozoa of post-thaw semen are highly variable from one male to the other, even after using the same freezing technique. To ensure that the inseminated females ovulate, hormonal manipulation of ovarian activity is used such as the induction of follicular activity and ovulation, as well as, synchronization of these phases in a group of females. The best time for insemination can only be determined by ultrasonography and/or rectal palpation of the ovaries. The other alternative is to inseminate at known intervals following induction of ovulation by hormonal treatment with human-chorionic gonadotropin (hCG) or gonadotropin-releasing hormone (Gn-RH). Reproduced with permission of CAB.

Tinson, A; Rajesh Sambyal; Kuhad, KS. **Practical application of embryo transfer in the dromedary camel.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 82-88.
Abstract: There have been considerable advances made in breeding research in the dromedary camel over the past 15 years. Direct embryo transfer (ET), frozen embryo transfer, twinning, pre-sexed embryo transfers, I.V.F and even the new species "Cama" have all occurred in a relatively short period of time. These advances from the Middle East have come on the back of a well-funded camel racing industry with sophisticated laboratory resources. But how can these advances be applied practically on a wider stage in the camel world. This paper will review the application and advantages of embryo transfer in a camel with emphasis on a more practical aspect of the techniques as developed at the Hilli ET centre and how they might be applied to the camel in the field in places such as Rajasthan. Reproduced with permission of CAB.

Descriptors: dromedary camels, racing camels,gestation, embryos, embryo transfer, techniques, pregnancy, reviews, Rajasthan, India.

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Aggarwal, RAK; Ahlawat, SPS; Sadana, DK; Singh, PK. **Semen banking for conservation of livestock biodiversity.** *Livestock International.* 2006; 10(8): 2, 17-20.
Descriptors: native livestock, dromedary camels, buffaloes, cattle, goats, horses, pigs, sheep,animal breeding, animal genetic resources, biodiversity, conservation, endangered breeds, AI, artificial insemination, cryopreservation, frozen semen, semen preservation, gene banks, information storage, India.

Al Busadah, KA. **Sustained luteal function following treatment with bovine somatotropin in pregnant camels.** *Journal of Animal and Veterinary Advances.* 2006; 5(12): 1233-1235, ISSN: 1680-5593
Abstract: This study was conducted to determine the possible action of bovine somatotropin (bST) on corpus luteum function in nonpregnant camels (n=10). Intramuscular administration of buserlin at a dose of 20 mg to camels caused oestrus in all animals 3 days after injection. It was observed that there was a significant increase in the concentration of progesterone in these animals when compared with those treated with saline, but the corpus luteum formed were short lived. Subcutaneous injection of somatotropin at a dose of 25 mg in these animals, caused a sustained luteal function. It is concluded that administration of somatotropin is one way to overcome luteal failure in camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, corpus luteum, luteolysis, estrous cycle, estrus, progesterone, somatotropin, breeding cycle, estrous cycle, estrus, growth hormone, reproductive cycle.

Aminu Deen; Sahani, MS. **Cryopreservation of camel semen.** *Journal of Camel Practice and Research.* 2006; 13(1): 1-6. ISSN: 0971-6777.
URL: www.camelsandcamelids.com
Abstract: A study on the cryopreservation of 70 semen samples artificially collected from 11 adult male camels of Jaisalmeri breed (dromedary) was conducted. The semen samples were diluted at the rate of 1:3 with Tris-egg yolk-glycerol extender, cooled in a refrigeratory unit and evaluated for progressive sperm motility in inverted phase contrast microscope (Nikon, 400x magnification) with attached video monitor 4-6 h after collection. Semen samples exhibiting good sperm motility were transferred to cryovials, each sample in duplicate, labelled and frozen in an automated liquid nitrogen based cryofreezer (Planner KRYO 10-1.3), where the vials were cooled to -100 degrees C followed by their immersion in liquid nitrogen container. Prefreeze motility varied from 47 to 70% in different males. Post-thaw motility declined from 23.5 to 47.5% in individual semen samples, with an overall estimated loss of 62.5% of the progressively motile spermatozoa due to freeze-thaw process. Based on the criteria adopted by several workers in camel AI (semen of 30% or greater post-thaw motility), only 37% of the semen samples processed in this study qualified for approval to be of use for AI. The rejection rate of more than 50% was greater than those of dairy bulls (5-15%). Post-thaw motility of the same semen samples cryopreserved in duplicate vials in the same batch differed significantly. Post-thaw duration of survival of spermatozoa was

studied by incubation at 37 and 4 degrees C. At 37 degrees C, the reduction in motility was about 50%. At 2, 3, 4 and 24 h after incubation, almost 93, 99 and 100% spermatozoa lost motility, respectively. At 4 degrees C incubation, the decline percentages were 17, 30, 35.8, 44.1 and 65.5 at 1, 2, 3, 4 and 24 h of incubation, respectively. Reproduced with permission of CAB.
Descriptors: dromedary camels, artificial insemination, AI, sperm, semen, semen characteristics, cryopreservation, semen diluents, egg yolk, freezing, glycerol, semen preservation; spermatozoa motility.

Deen, A; Sahani, MS. **Superovulation response to a progestagen ear implant, PMSG and HCG treatment in female camels.** *Israel Journal of Veterinary Medicine.* 2006; 61(2): 60-63. ISSN: 0334-9152. Note: In English with Hebrew summary.
URL: http://www.isrvma.org/TextPage.aspx?ID=25
Abstract: A group of 8 female camels was given superovulation treatment with a Crestar ear implant*, Folligon** and Professi***. A single Crestar injection of 2 ml was given intramuscularly (i/m) along with a Crestar ear implant, which was kept in situ for 7 days, and then removed. An i/m injection of Folligon (2000-4000 i.u) was given at the time of removal of the implant. The animals were monitored for follicular growth in their ovaries and were bred at appropriate times. An i/m injection of Professi (5000 i.u. hCG) was given at breeding time. Recto-genital palpation and endocrine profiles of progesterone (P< sub>4</ sub>) were regularly monitored at appropriate intervals to assess the ovulation response and follicular growth respectively. P< sub>4</ sub> profiles indicated that 4/8 (50%) females did not ovulate in response to superovulation treatment. Recto-genital palpation indicated that the ovulation response was unremarkable in the other 4 animals. This varied from ICL to 3-5 CLs. Thick-walled, bilateral cysts were observed in one female while another had a unilateral, thin-walled cyst that ruptured during ovarian palpation. Embryos could not be recovered from these females by non-surgical uterine flushing. Loss of fluid into the vagina during flushing of the uterus ix problematic in this species. This could be due to improper fixation of the catheter bulb in the uterine horn or il ix pushed back under the pressure of infused fluid in the act of retraction of the uterine horns during flushing. It is concluded that embryos could not be recovered due to a poor superovulation response, while the loss of fluid into the vagina is also problematical. This needs to be resolved for the development of a multiple ovulation and embryo transfer programme. Reproduced with permission of CAB.
Descriptors: dromedary camels, embryos, HCG, ovaries, ovulation, PMSG, progesterone, superovulation techniques, uterus.

El Hassanein, EE. **Freezability of camel semen collected by "El-Hassanein Camel Dummy" and diluted in two steps in sucrose and/or Tris-based extenders.** *Veterinary Medical Journal Giza.* 2006; 54(1): 29-46. ISSN: 1110-1423. Note: In English with an Arabic summary.
Abstract : Eight adult male camels were examined for semen collection technique during rutting season between November 2001 and March 2002 by using the recently invented "El-Hassanein Camel Dummy" at Maryout Research Station of Desert Research Centre. Sucrose, Tris extender and their combinations were used for preparing five semen diluents. Dilution to 150x106 motile sperms/ml was carried out in two steps and the 0.5 ml straws were filled with diluted semen. Three freezing and two thawing rates were applied to evaluate sper-

matozoa freezability and post-thawing viability. Progressive motility (PPM) and acrosomal integrity (PLA) were evaluated at 0, 2 and 4 hours of post-thawing incubation. The new semen collection technique significantly improved the quantity and quality of the collected semen. The obtained semen volume, ejaculate concentration, progressive motility and acrosomal integrity averages were 15.3+or-1.15 ml, 810.3+or-2.21x106 sperm/ml, 81.6+or-1.01% and 89.7+or-1.94%, respectively. Dilution of camel spermatozoa in a Sucrose-Tris extender significantly reduced dilution effect on spermatozoa viability and improved their freezability and their post-thawing viability. Higher freezing rates significantly conserved post-thawing viability. Slow and rapid-thawing rates had a relatively comparable effect on post-thawing viability. However, the optimum sperm viability was achieved in semen frozen rapidly (-140 degrees C for 15 min) and thawed slowly (40 degrees C for 30 sec) after dilution in an extender composed of 4.38% (g/v) sucrose, 1.592% (g/v) Tris, 0.872% (g/v) citric acid monohydrate, 20% (v/v) egg-yolk, 3.5% (v/v) glycerol, 1000 IU penicillin/ml and 1000 micro g streptomycin/ml. Estimated reductions in PPM pre-freezing, post-thawing and after 2 and 4 hours of incubation post-thawing were 5.5, 6.1, 23.3 and 42.5%, respectively. Corresponding reductions in PIA were 5.9, 9.1, 15.7 and 35.3%, respectively. It is concluded that combination of sucrose and Tris in camel semen extender has positive effect on viability of spermatozoa after dilution, freezing and post-thawing incubation. Reproduced with permission of CAB.

Descriptors: dromedary camels, males, semen, freezing ability of camel spermatozoa, acrosome, acrosome reaction, citric acid, freeze thaw cycles, penicillins, streptomycin, semen characters, semen volume, semen diluent additives, sucrose, sperm motility.

Hadj Khatir; AbdelHaq Anouassi. **The first dromedary (*Camelus dromedarius*) offspring obtained from in vitro matured, in vitro fertilized and in vitro cultured abattoir-derived oocytes.** *Theriogenology*. 2006; 65(9): 1727-1736. ISSN: 0093-691X

NAL call no.: QP252.A1T5

Abstract: Dromedary offspring have never been produced fully in vitro. We have previously demonstrated that embryos obtained by culture in semi-defined medium (mKSOMaa) have better in vitro development ability than those cultured with oviductal epithelial cells. The aim of the present experiment was to study the pregnancy rate after embryo transfer of in vitro-produced (IVP) dromedary embryos cultured in semi-defined modified medium (mKSOMaa). IVM/IVF procedures were conducted on six hundred and sixty four (664) cumulus oocytes complexes (COCs) aspirated from ovaries collected at a local slaughterhouse and cultured in vitro (38.5 degrees C; 5% CO< sub>2</ sub>, and maximum humidity >95%). Maturation was completed by incubation in TCM-199 medium supplemented with 10% heat-treated Fetal Calf Serum (FCS), 10 ng/mL EGF, 1 micro g/mL FSH, 1 micro g/mL E2 and 500 micro M cysteamine for 30 h. In vitro fertilization was performed using fresh semen (0.5x106 spermatozoa/mL in modified TALP-solution). Fertilized oocytes were cultured in mKSOMaa, under 38.5 degrees C, 5% CO< sub>2</ sub> and 90% N< sub>2</ sub> with maximum humidity (>95%). All IVC steps were done in seven replicates. The cleavage rate (two cells to blastocyst stage) was 64% (425/664) and the percentage of oocytes reaching the blastocyst stage was 23% (155/664). The hatching rate of blastocyst obtained after culture was 46% (71/155). Good quality hatched blastocysts (n=66) were transferred individually to synchronized recipients. Pregnancy rates, determined by ultrasonography at

15, 60 and 90 days after embryo transfer (ET), were 38%, 32% and 27%, respectively. Out of 18 pregnant females 5 aborted between the fifth and seventh month of pregnancy and 13 females (20%) remained pregnant. After 385 days of pregnancy, the first healthy and normal male-dromedary offspring produced fully in vitro was born at a birth weight of 38 kg. More dromedary calves (n=4) were born later on. The remaining pregnant females (n=8) are due to calf within the next months. In conclusion, this is the first reported offspring in camelids obtained by transfer of embryos produced by IVM, IVF and IVC using abattoir-derived oocytes, fresh semen and culture in a semi-defined medium. Reproduced with permission of CAB.
Descriptors: dromedary camels, ovaries, post slaughter oocyte harvesting, in vitro oocyte maturation, culture media, in vitro fertilization, semen, embryo transfer, embryonic development, in vitro culture, embryo transfer, pregnancy rate, first reported offspring.

Hema Tripathi; Rajput, DS. **Customs and beliefs of Raika pastoralists of Rajasthan associated with camel husbandry.** *Indian Journal of Traditional Knowledge.* 2006; 5(2): 284-286. ISSN: 0972-5938
URL: http://www.niscair.res.in
Descriptors: dromedary camels, agricultural systems, customs and beliefs, traditional camel raisers, Rajasthan, India.

Khatir, H; Anouassi, A. **The first dromedary (*Camelus dromedarius*) offspring obtained from in vitro matured, in vitro fertilized and in vitro cultured abattoir-derived oocytes.** *Theriogenology.* 2006 June; 65(9): 1727-1736. ISSN: 0093-691X
DOI: http://dx.doi.org/10.1016/j.theriogenology.2005.09.029
NAL call no.: QP252.A1T5
Abstract: Dromedary offspring have never been produced fully in vitro. We have previously demonstrated that embryos obtained by culture in semi-defined medium (mKSOMaa) have better in vitro development ability than those cultured with oviductal epithelial cells. The aim of the present experiment was to study the pregnancy rate after embryo transfer of in vitro-produced (IVP) dromedary embryos cultured in semi-defined modified medium (mKSOMaa). IVM/IVF procedures were conducted on six hundred and sixty four (664) cumulus oocytes complexes (COCs) aspirated from ovaries collected at a local slaughterhouse and cultured in vitro (38.5 AC; 5% CO2, and maximum humidity >95%). Maturation was completed by incubation in TCM-199 medium supplemented with 10% heat-treated Fetal Calf Serum (FCS), 10 ng/mL EGF, 1 micrograms/mL FSH, 1 micrograms/mL E2 and 500 micromolar cysteamine for 30 h. In vitro fertilization was performed using fresh semen (0.5 x 10(6) spermatozoa/mL in modified TALP-solution). Fertilized oocytes were cultured in mKSOMaa, under 38.5 AC, 5% CO2 and 90% N2 with maximum humidity (>95%). All IVC steps were done in seven replicates. The cleavage rate (two cells to blastocyst stage) was 64% (425/664) and the percentage of oocytes reaching the blastocyst stage was 23% (155/664). The hatching rate of blastocyst obtained after culture was 46% (71/155). Good quality hatched blastocysts (n = 66) were transferred individually to synchronized recipients. Pregnancy rates, determined by ultrasonography at 15, 60 and 90 days after embryo transfer (ET), were 38%, 32% and 27%, respectively. Out of 18 pregnant females 5 aborted between the fifth and seventh month of pregnancy and 13 females (20%) remained pregnant. After

385 days of pregnancy, the first healthy and normal male-dromedary offspring produced fully in vitro was born at a birth weight of 38 kg. More dromedary calves (n = 4) were born later on. The remaining pregnant females (n = 8) are due to calf within the next months. In conclusion, this is the first reported offspring in camelids obtained by transfer of embryos produced by IVM, IVF and IVC using abattoir-derived oocytes, fresh semen and culture in a semi-defined medium.
Descriptors: dromedaries, embryo culture, embryo transfer, culture media, cell cleavage, embryogenesis, blastocyst, oocytes, calving rate, pregnancy rate, offspring, United Arab Emirates.

Wani, Nisar A; Wernery, U. **Parthenogenetic activation of camel (*Camelus dromedarius*) oocytes**. *Biology of Reproduction.* 2006; (Sp. Iss. SI): 112. ISSN: 0006-3363. Note: 39th Annual Meeting of the Society for the Study of Reproduction, Omaha, NE, USA; July 29-August 01, 2006.
Descriptors: dromedary camels, oocytes, parthenogenetic activation, invitro vertilization, cloning, maturation promoting factor, aceto-orcein, diethylaminopurine.

Yagil, R. **Reproductive processes in camels (*Camelus dromedarius*).** *Israel Journal of Veterinary Medicine.* 2006; 61(2): 52-55. ISSN: 0334-9152
URL: http://www.isrvma.org/TextPage.aspx?ID=25
Abstract: Interest in the camel's (*Camelus dromedarius*) reproductive processes only began when its economic benefits became apparent. There are specific anatomical, behavioral, physiological and endocrinological peculiarities of camel reproduction, and data available about 30 years ago were gathered from discussions with nomadic camel herders and based on their direct needs. Camel reproduction has gathered momentum in the meanwhile, and well-equipped laboratories are now performing the most modern techniques. Most camels are found in Third World countries where they provide marketable products, therefore the focus should be on techniques that take into account the herders' level of competence.
Descriptors: dromedary camels, animal anatomy, camel behavior, endocrinology, morphology, reproduction.

Zhao ZhenJun; Ouyang YingChun; Nan ChangLong; Lei ZiLi; Song XiangFen; Sun QingYuan; Chen DaYuan. **Rabbit oocyte cytoplasm supports development of nuclear transfer embryos derived from the somatic cells of the camel and Tibetan antelope.** *Journal of Reproduction and Development.* 2006; 52(3): 449-459. ISSN: 0916-8818
URL: http://wwwsoc.nii.ac.jp/jsar/
Abstract: This study was designed to examine the ability of rabbit metaphase II oocyte cytoplasm to support the development of interspecies nuclear transfer embryos reconstructed using donor nuclei from different species. Skin fibroblast cells from a camel and Tibetan antelope were used as donor nuclei. As a first step, we investigated the efficiency of different activation protocols by comparing the parthenogenetic development of rabbit oocytes. The protocol that yielded the highest blastocyst rate was used to activate the reconstructed embryos in nuclear transfer experiments. In addition, the effect of donor cell serum starvation on the development of the reconstructed embryo was also examined. More than half of the karyoplast-cytoplast couplets could be fused, and about one third of the reconstructed

embryos were capable of completing first cleavage, regardless of the species of donor nuclei. Some of the cleaving reconstructed embryos were even capable of progressing further and developing to the blastocyst stage (1.4-8.7% for the Tibetan antelope and 0-7.5% for the camel, respectively). Our results suggest that the mechanisms regulating early embryo development may be conserved among mammalian species and some factors existing in rabbit oocyte cytoplasm for somatic nucleus reprogramming and dedifferentiation may not be species-specific. Rabbit oocyte cytoplasm can reprogram donor nuclei regardless of the origin of the nucleus and support in vitro development to an advanced stage.
Descriptors: camels, rabbits, Tibetan antelope, *Pantholops hodgsonii,* oocytes, parthenogenesis, embryo transfer, in vitro embryo culture, embryonic development, blastocyst, cleavage, cytoplasm, nuclear transfer.

2005

Aminu Deen; Sumant Vyas; Gorakh Mal; Sahani, MS. **Is low efficiency under AI in camel due to ovulation problems?** *Journal of Camel Practice and Research.* 2005; 12(2): 123-125. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted on 10 breedable female dromedary camels of 6 to 10 years of age bearing mature sized follicles in their ovaries as revealed by sonographic examinations (Pie-scanner-200 using transvaginal transducer of 7.5 MHz capacity). Exogenous hormone (Profassi, 5000 i.u., Serono, Italy) was administered to induce ovulation followed by artificial insemination. The objectives of the study were to evaluate efficiency of HCG to induce ovulation and to impregnate female camels with artificial insemination (AI). Peripheral plasma progesterone analysis either daily or on alternate days from day 0 to 30 was used to assess ovulation and pregnancy status. Behavioural and clinical examinations were also regularly performed for pregnancy. Blood samples for analysis of peripheral plasma progesterone were regularly harvested and quantified by radioimmunoassay (RIA) kits. Counting of radioactive disintegration was accomplished in automated gamma-counter PC-RIA MAS 06. None of the 10 inseminated female camels conceived with 0.5-1.0 ml of freshly collected camel semen deposited into the uterus. Nine out of 10 female camels exhibited a significant rise in P< sub>4</ sub> (>1 ng/ml) at varying stages after HCG administration. The first rise in P< sub>4</ sub> concentration above 1 ng/ml after HCG administration was recorded on days 3, 4, 6, 8, 9 and 10 in 1, 3, 2, 1, 1 and 1 of the 9 responding females, respectively. P< sub>4</ sub> concentration above 1 ng/ml persisted for 2-3 days in 5/9 females and 5-7 days in 4/9 females. The magnitude of rise in P< sub>4</ sub> concentration was greater in the latter compared to the former group. The P< sub>4</ sub> profiles of the latter group of animals indicated that these animals have definitely ovulated and developed a normal corpus luteum, while P< sub>4</ sub> profiles of another 5 females were difficult to interpret in terms of ovulation and corpus luteum formation. Either these animals have undergone follicular luteinization without ovulation or else ovulated and developed a weak corpus luteum with a short life span. In conclusion, 40% of HCG treated and inseminated female camels definitely ovulated and developed a normal corpus luteum. More work is required to assess the failure of conception in these females, which apparently may be due to low dose of

inseminated semen. It was difficult to interpret the induction of ovulation in another 5 females because of the relatively low magnitude and duration of progesterone rise. Reproduced with permission of CAB.
Descriptors: dromedary camels, artificial insemination, AI, corpus luteum, HCG, ovarian follicles, ovaries, ovulation, pregnancy, progesterone, semen.

Aminu Deen; Sumant Vyas; Sahani, MS. **Problems of artificial insemination in dromedarius camel - failure of ovulation and entrapment of spermatozoa in gelatinous camel semen.** *Veterinarski Arhiv.* 2005; 75(4): 293-301. ISSN: 0372-5480. Note: In English with a Croatian summary.
Abstract: An artificial insemination study was conducted on 17 female camels which were administered human Chorionic Gonadotropin (hCG) to induce ovulation after confirming a follicle in the ovaries using sonography. The animals were inseminated with either diluted-cooled or fresh undiluted semen. No female camel could be impregnated with diluted and cooled semen, while pregnancy rate was low with neat undiluted semen. To ascertain possible causes of low conception rate, plasma progesterone (P< sub>4</ sub>) profiles were monitored. Criteria adopted for interpretation of these profiles were as follows: P< sub>4</ sub> levels below 1 ng/ml on days 5-8 was considered to indicate failure to ovulate; a single peak of 1 ng/ml on days 5-8 followed by a decline on day 12 was considered to indicate ovulation. However, failure of fertilization and P< sub>4</ sub> levels of more than 1 ng/ml on days 5-8 and day 12 followed by a decline was considered to indicate successful ovulation and fertilization, but failure of embryo survival. Consistently higher levels of P< sub>4</ sub> were considered to be indicative of pregnancy. Using these criteria, 5 of 33 inseminations were diagnosed as pregnant, while profiles of 17 of 33, 8 of 33 and 3 of 33 were indicative of failure of ovulation, failure of fertilization and failure of embryo survival, respectively. A high incidence of failure of ovulation may be due to oversized follicles or follicles in which degenerative processes might have been initiated prior to administration of hCG. High failure of fertilization may be due to a viscous form of camel semen, which may play a role as a sperm reservoir and protect the viability of spermatozoa in the female genital tract by entrapping sperm. Insemination with diluted and cooled semen may disturb the protection, resulting in failure of conception. It is concluded that the high incidence of ovulation failure and failure to deposit sperm in its natural entrapped viscous form are the major problems for development of AI in the camel. Further improvement may be expected, if we are able to standardize the appropriate insemination time around peri ovulatory time, and appropriate follicular size, which responds to hCG. Reproduced with permission of CAB.
Descriptors: dromedary camels, females, artificial insemination, conception rate, embryos, fertilization, HCG, ovarian follicles, ovulation, pregnancy rate, progesterone, semen preservation, semen diluents, sperm reserves, survival, sperm viability in female genitalia.

Al Qarawi, AA; El Belely, MS. **Influence of age, superovulatory treatment, method of recovery and season on embryo production in the dromedary camel.** *Reproduction in Domestic Animals.* 2005; 40(4): 345. ISSN: 0936-6768. Note: "9th Annual Conference of the European Society for Domestic Animal Reproduction (ESDAR), Murcia, Spain; September 01 -03, 2005."
NAL call no: SF105.A1Z8

Descriptors: dromedary camels, females, artificial insemination, embryo production, follicle stimulating hormones, progesterone, superovulation, treatment, methods for recovery, influence of various factors.

Al Qarawi, AA. **Concentrations of plasma progesterone, oestradiol-17 beta, and luteinizing hormone in superovulated dromedary camels.** *Reproduction in Domestic Animals.* 2005; 40(4): 345. ISSN: 0936-6768. Note: "9th Annual Conference of the European Society for Domestic Animal Reproduction (ESDAR), Murcia, Spain; September 01 -03, 2005."
NAL call no: SF105.A1Z8
Descriptors: dromedary camels, females, superovulation, hormones, blood values, luteinizing hormone, follicle stimulating hormone, FSH, gonadotrophin, estradiol 17beta.

Al Qarawi, AA. **Infertility in the dromedary bull: a review of causes, relations and implications.** *Animal Reproduction Science.* 2005 June; 87(1-2): 73-92. ISSN: 0378-4320
NAL call no .: QP251.A5
Descriptors: dromedaries, males, male fertility, literature reviews, breeding season, mating frequency, estrus, female fertility, reproductive disorders, infection, testes, spermatozoa, anabolic steroids, testosterone, libido, sperm motility, inflammation, animal injuries, pregnancy rate, estrogens, hormone secretion, thyroid diseases, African trypanosomiasis, histamine, hyperestrogenemia.

Aminu Deen; Sumant Vyas; Sahani, MS. **Problems of artificial insemination in dromedarius camel - failure of ovulation and entrapment of spermatozoa in gelatinous camel semen.** *Veterinarski Arhiv.* 2005; 75(4): 293-301. ISSN: 0372-5480. Note: In English with a Croatian summary.
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failure of conception. It is concluded that the high incidence of ovulation failure and failure to deposit sperm in its natural entrapped viscous form are the major problems for development of AI in the camel. Further improvement may be expected, if we are able to standardize the appropriate insemination time around peri ovulatory time, and appropriate follicular size, which responds to hCG. Reproduced with permission of CAB.
Descriptors: dromedary camels, artificial insemination, conception rate, embryos, fertilization, HCG, ovarian follicles, ovulation, pregnancy rate, progesterone, semen preservation, semen diluents, sperm reserves, survival, sperm viability in female-genitalia.

Aminu Deen; Sumant Vyas; Gorakh Mal; Sahani, MS. **Is low efficiency under AI in camel due to ovulation problems?** *Journal of Camel Practice and Research.* 2005; 12(2): 123-125. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was conducted on 10 breedable female dromedary camels of 6 to 10 years of age bearing mature sized follicles in their ovaries as revealed by sonographic examinations (Pie-scanner-200 using transvaginal transducer of 7.5 MHz capacity). Exogenous hormone (Profassi, 5000 i.u., Serono, Italy) was administered to induce ovulation followed by artificial insemination. The objectives of the study were to evaluate efficiency of HCG to induce ovulation and to impregnate female camels with artificial insemination (AI). Peripheral plasma progesterone analysis either daily or on alternate days from day 0 to 30 was used to assess ovulation and pregnancy status. Behavioural and clinical examinations were also regularly performed for pregnancy. Blood samples for analysis of peripheral plasma progesterone were regularly harvested and quantified by radioimmunoassay (RIA) kits. Counting of radioactive disintegration was accomplished in automated gamma-counter PC-RIA MAS 06. None of the 10 inseminated female camels conceived with 0.5-1.0 ml of freshly collected camel semen deposited into the uterus. Nine out of 10 female camels exhibited a significant rise in P< sub>4</ sub> (>1 ng/ml) at varying stages after HCG administration. The first rise in P< sub>4</ sub> concentration above 1 ng/ml after HCG administration was recorded on days 3, 4, 6, 8, 9 and 10 in 1, 3, 2, 1, 1 and 1 of the 9 responding females, respectively. P< sub>4</ sub> concentration above 1 ng/ml persisted for 2-3 days in 5/9 females and 5-7 days in 4/9 females. The magnitude of rise in P< sub>4</ sub> concentration was greater in the latter compared to the former group. The P< sub>4</ sub> profiles of the latter group of animals indicated that these animals have definitely ovulated and developed a normal corpus luteum, while P< sub>4</ sub> profiles of another 5 females were difficult to interpret in terms of ovulation and corpus luteum formation. Either these animals have undergone follicular luteinization without ovulation or else ovulated and developed a weak corpus luteum with a short life span. In conclusion, 40% of HCG treated and inseminated female camels definitely ovulated and developed a normal corpus luteum. More work is required to assess the failure of conception in these females, which apparently may be due to low dose of inseminated semen. It was difficult to interpret the induction of ovulation in another 5 females because of the relatively low magnitude and duration of progesterone rise. Reproduced with permission of CAB.
Descriptors: dromedary camels, breedable females, artificial insemination, AI, corpus luteum, HCG, ovarian follicles, ovaries, ovulation, pregnancy, progesterone, semen.

Deen, A; Vyas, S; Sahani, MS. **Testosterone profiles in the camel (*C. dromedarius*) during the rutting season.** *Israel Journal of Veterinary Medicine*. 2005; 60(1): 27-32, He 27. ISSN: 0334-9152

URL: http://www.isrvma.org/TextPage.aspx?ID=25

Abstract: The present study was conducted on 10 adult male camels over a period of 2 consecutive years to characterize peripheral plasma testosterone profiles in relation to rutting activity. Blood plasma testosterone profiles were monitored during pre-rut, rut and post-rut stages at weekly intervals by RIA. Testosterone concentration in peripheral plasma is low during the pre-rut period (342.93+or-43.90 ng/ml). Onset of rut activity is associated with significant rise in testosterone concentration (4213.94+or-278 ng/dl), which is maintained for 11-18 weeks followed by decline to basal levels. The onset of rise as well as decline varied individually. It is also not uncommon to observe complete absence of endocrine surge and rut behavior in some (1/5 in present study) males throughout breeding season. Genetic, nutritional, management, environmental or other possible reasons for this remains to be explored. It is not uncommon for certain young males to exhibit complete shyness when attempted for semen collection despite high testosterone concentration and other external sexual behavior symptoms, which apparently may be due to lack of exposure. The libido and production of semen into AV is maintained for 3-5 months followed by cessation, which also varied individually. Libido subsides in some males in March, in few more in April. Some males continue to have good libido by the end of May. After May, majority of the males lose libido and are rendered unable to copulate in AV. Cessation of libido and ability to copulate appears to be associated with decline in testosterone concentration. Cessation of libido appears to be due to erectile impotence. The critical level of testosterone required for erectile potency needs to be worked out. This work shows the correlation between hormone profiles and ambient temperature.

Descriptors: dromedary camels, adult males, breeding season, mating behavior, sexual behavior, libido, testosterone, hormone secretions, semen, seasonal variations, environmental temperature, radioimmunoassay.

Derar, DRI; Hussein, HA; Saleh, AM. **Morphometric and immunohistochemical variations in the camel (*Camelus dromedarius*) testis in relation to some endocrinological aspects during different seasons of the year.** *Assiut Veterinary Medical Journal.* 2005; 51(104): 273-287. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: Seasonal variation in serum testosterone, thyroxine and the testicular morphology were studied in 54 sexually mature and apparently healthy one-humped camels during the different seasons of the year. The testosterone and thyroxine serum levels were measured, and 3 beta -hydroxysteroid dehydrogenase (3 beta -HSD) activity of Leydig cells was assessed immunohistochemically to aid in the interpretation of results. The activity of 3 beta -HSD was high during cold months and severely depressed with minimum activity in hot months. Concomitantly, serum testosterone and thyroxine levels increased during the winter and early spring and decreased thereafter. Their levels reached the peak during the months of January until April. These results suggested that 3 beta -HSD was a key enzyme in the regulation of the testosterone production in Leydig cells of the male dromedary. Thyroxine was a crucial hormone for the male reproductive activity during the breeding season in the dromedary and fluctuated in the same pattern as serum male androgen.

Descriptors: dromedary camels, male camels, morphology, morphometrics, testes, testicles, androgens, testosterone, thyroxine, enzyme activity, hydroxysteroid dehydrogenase, Leydig cells, seminiferous tubules, seasonal variation, seasonal fluctuations.

Kafi, M; Mesbah, F; Nili, H; Khalili, A. **Chronological and ultrastructural changes in camel (*Camelus dromedarius*) oocytes during in vitro maturation.** *Theriogenology*. 2005 June; 63(9): 2458-2470. ISSN: 0093-691X
NAL call no.: QP252.A1T5
Abstract: Cumulus-oocyte complexes (COCs) were collected from non-pregnant camels at a local slaughterhouse by aspiration from antral follicles (2-6 mm). In Experiment I, camel COCs (n = 304) were matured in vitro in Hams-F10, fixed at different time intervals (6, 12, 18, 24, 30, 36, 42, or 48 h) and stained with 1% aceto-orcein to assess nuclear changes in culture. A majority of the oocytes (81.5%) underwent germinal vesicle break down (GVBD) between 6 and 12 h. Forty-eight percent of the oocytes were observed at the metaphase I (M I) stage by 18 h culture. The percentage of matured oocytes (M II stage) at 30 and 42 h were 66.5 and 71% respectively, which were significantly ($p < 0.05$) different to that observed at 24 h (42.5%). In Experiment II, after different periods of culture (12, 24, 36, or 48 h), the COCs (n = 26) were processed for transmission electron microscopy. Expansion of both the cumulus and corona radiate cells occurred between 12 and 24 h in the majority of oocytes concomitant with enlargement of the cumulus cell process endings (CCPEs) in the developed perivitelline space. After 12 h of culture disruption of the junctions between CCPEs and the oolemma was observed together with and breakdown of the GV. For 24-36 h of culture cortical granules had spread and aligned along the oolemma. Signs of degeneration in the cytoplasmic organelles of the oocytes were also observed from less than 36 h. After 48 h of culture, larger vesicles and lipid droplets had appeared in the central part of the oocytes and showed uneven distribution throughout the ooplasm. Predominantly non-penetrating CCPEs were also observed in four oocytes by 48 h. In conclusion, based on both light and electron microscopic evaluations, the optimal culture time for the development of competent Camelus dromedarius oocytes in vitro appears to be 30 h using Hams-F10 medium.
Descriptors: dromedaries, in vitro culture, cumulus oophorus, germinal vesicle, meiosis, microvilli, ultrastructure, Iran.

Khatir, H; Anouassi, A; Tibary, A. **In vitro and in vivo developmental competence of dromedary (*Camelus dromedarius*) embryos produced in vitro using two culture systems (mKSOMaa and oviductal cells).** *Reproduction in Domestic Animals*. 2005; 40(3): 245-249. ISSN: 0936-6768
DOI: http://dx.doi.org/10.1111/j.1439-0531.2005.00587.x
NAL call no: SF105.A1Z8
Abstract: Development competence and pregnancy rate of in vitro-produced (IVP) dromedary embryos were studied in two culture systems: (i) semi-defined modified medium (mKSOMaa) and (ii) co-culture using camel epithelial oviducal cells. Five hundred and three cumulus-oocytes complexes (COCs) were selected, allowed to mature, fertilized and cultured in vitro (38.5 degrees C; 5% CO< sub>2</ sub>, maximum humidity >95%, with concentration of oxygen of 5% for semi-defined medium and 20% for co-culture cells). Maturation was accomplished by incubation in TCM-199 medium supplemented with 10% heat-treated

fetal calf serum (FCS), 10 ng/ml epidermal growth factor, 1 micro g/ml follicle-stimulating hormone, 1 micro g/ml oestradiol and 500 micro M cysteamine for 30 h. In vitro fertilization (IVF) was performed using fresh semen (0.5x106 spermatozoa/ml in modified TALP solution). Fertilized COCs were denuded by vortexing, then cultured in either mKSOMaa (10% heat-treated FCS was added 24 h post-IVF), under 5% O< sub>2</ sub> and 90% N< sub>2</ sub> (group 1; n=249) or with dromedary epithelial oviducal cell monolayers in TCM-199 with 10% heat-treated FCS under 20% O< sub>2</ sub> (group 2; n=254). The rate of cleavage was significant higher (p<0.05) for group 1 (63%, 156/249) than for group 2 (51%, 130/254). No significant difference was found between the two groups in the rate of development to blastocyst (21% vs 16.5%) and their hatchability (21% vs 14%). Pregnancy rates were similar for the first 60 days. However, all pregnancies were lost after 60 days with the exception of two of six (33%) from recipients of hatched blastocysts from group 1. We conclude that both systems support in vitro production of dromedary embryos by in vitro maturation (IVM)/IVF of oocytes. However, embryos obtained by culture in the semi-defined medium (mKSOMaa) appear to have a better in vivo development ability. Reproduced with permission of CAB.

Descriptors: dromedary camels, embryos, embryo culture, embryonic development, fertility, in vitro fertilization, culture media, oviducts, oocytes, oocyte maturation, pregnancy rate, gestation, blastocyst, embryogenesis, embryo transfer, blastocyst hatchability.

Mahmoud, KGM; Scholkamy, TH; Farghaly, A; Nawito, MF. **Chromosomal aberrations, sister chromatid exchanges and nuclear status of immature oocytes in relation to age of dromedary camels.** *Cytologia.* 2005; 70(3): 295-302. ISSN: 0011-4545

Abstract: The present study was conducted to analyse the chromosomes of blood culture and oocyte chromatin quality at the time of recovery in dromedary camels in relation to age. Twelve young (about one year) and twelve adult (4-10 years old) female camels were used. These animals with unknown reproductive history were slaughtered in Kerdasa abattoir (Giza province, Egypt). Blood samples were collected via sterile syringes from camels before slaughtering for chromosomal analysis. Oocytes from ovaries of both ages were aspirated from small antral follicles 1 to 5 mm in diameter and classified according to their quality into four categories. Nuclear status of cumulus oocytes complexes (COCs) were evaluated directly after collection. The results indicated that, the frequencies of chromosomal abnormalities and sister chromatid exchanges (SCE'S) were increased significantly (p<0.05) with age. An increase in structural aberrations could be observed. There were no significant differences between young and adult camels in total number and quality of oocytes. Statistically significant (p<0.01) differences were between percentages of germinal vesicle breakdown (GVBD) and Germinal vesicle (GV) in young and adult camels. It is concluded that, the increase of age may have significant effects on structural chromosomal aberrations, SCE'S and meiotic stages of immature camel oocytes but not on the number and quality of oocytes. Reproduced with permission of CAB.

Descriptors: dromedary camels, age groups, blood, chromatids, chromosome aberrations, chromosomes, genetic analysis, oocyte maturation, oocytes, ovarian follicles, ovaries, chromosome abnormalities.

Nowshari , MA ; Ali, SA. **Effect of season and gonadotropins on the superovulatory response in camel (*Camelus dromedarius*).** *Theriogenology*. 2005 Oct 15; 64(7): 1526-1535. ISSN: 0093-691X

NAL call no.: QP252.A1T5

Abstract: The purpose of the present investigation was to study the extent to which season and the gonadotropin preparation interferes with the superovulatory response in the dromedary. Adult camels were treated for superovulation during the breeding (November to April) and non-breeding season (May to October). Animals were synchronized by daily i.m. injections of progesterone (125 mg/animal/day, Jurox, UK) for 10 to 14 days. Superovulation was induced by 400 mg pFSH alone (Follitropin V, Vetrepharm, Canada) administered in eight descending doses at 12 h intervals or a combination of PMSG (2000 IU, Folligon, Intervet, The Netherlands), injected with last injection of progesterone and 400 mg pFSH in eight descending doses. The follicular development was daily assessed by ultrasonography of the ovaries. The donors were classified as per their response to the superovulatory treatment into very good (> 10 follicles), good (5-10 follicle), poor (2-4 follicles) or no response (1 or no follicle) on each ovary. Ovulation was induced by injecting 3000 IU hCG (Chorulon, Intervet) at the time of first mating. The donors were mated twice at an interval of 12 h when all or most of the follicles reached to a size of about 1.0-1.7 cm. Camels were flushed non-surgically on Day 6 or 7 after the ovulation. The proportion of camels showing very good response during the breeding as well as non-breeding season was higher ($P < 0.05$) when a combination of pFSH and eCG was used compared with pFSH only. There was no difference ($P > 0.05$) in the proportion of donors flushed successfully (embryos recovered) when treated either with a combination of pFSH and eCG or pFSH alone during the breeding and non-breeding season. The rate of recovery of ova/embryos and proportion of transferable embryos was higher ($P < 0.05$) when donors were treated with pFSH + eCG compared with pFSH only during the breeding as well as non-breeding season. The results may indicate that ova/embryo recovery rate of the dromedary is influenced by the gonadotropin preparation but is not appreciably affected by the season.

Descriptors: dromedary camels, breeding season, superovulation, follicle stimulating hormone, human chorionic gonadotropin, equine chorionic gonadotropin, United Arab Emirates.

Nowshari , MA . **The effect of harvesting technique on efficiency of oocyte collection and different maturation media on the nuclear maturation of oocytes in camels (*Camelus dromedarius*).** *Theriogenology*. 2005 June; 63(9): 2471-2481. ISSN: 0093-691X

NAL call no.: QP252.A1T5

Abstract: The purpose of this investigation was to develop an efficient method for harvesting oocytes from dromedary camel ovaries and to examine the effect of different maturation media on their subsequent maturation in vitro. Oocytes were collected by aspirating the follicular contents using a needle attached to a syringe (Method I, n = 163 ovaries) or to a constant aspirating pressure, applied by a vacuum pump (Method II, n = 117 ovaries). Individual follicles were excised from ovaries and follicles were punctured with two needles (Method III, n = 117). Oocytes were matured in vitro for 40-42 h. At the end of maturation period, oocytes were denuded of cumulus cells and the proportion of oocytes in metaphase-II (MII) stage was determined. In the second experiment, oocytes collected by the dissection

method were matured in Tissue Culture Medium199 (TCM), CR1 or modified Connaught Medical Research Laboratories medium-1066 (CMRL) and their nuclear maturation was evaluated after 40-42 h. The recovery rate of oocytes was higher ($P < 0.01$) with Method III compared with Method I or II (94, 31 and 33%, respectively). A higher proportions of oocytes collected with Method I or II were either completely or partially denuded compared with Method III (31, 14% versus 1%). The proportions of viable oocytes (78, 60 and 70%, respectively) and those showing metaphase II was not different (39, 50 and 46%, respectively, $P > 0.05$) among the three treatment groups. Oocyte maturation rate was higher ($P < 0.05$) when TCM was used compared with CMRL or CR1 medium. There was, however, no difference in the maturation rate for oocytes cultured in CMRL or CR1 medium. It may be concluded that a higher proportion of cumulus enclosed oocytes may be recovered by follicle dissection method compared to aspiration using syringe or pump. The higher recovery rate with a comparable proportion of viable and matured oocytes resulted in the overall increase in the number of matured (MII) oocytes/ovary with follicle dissection procedure compared with aspiration procedures. For in vitro maturation of oocytes, TCM is superior to CR1 and CMRL as basic maturation medium for this species.
Descriptors: dromedaries, females, Graafian follicles, maturation culture media, meiosis, cumulus oophorus, oocyte harvesting, oocyte recovery rate, methodology.

Nowshari , MA ; Ali, SA; Saleem, S. **Offspring resulting from transfer of cryopreserved embryos in camel (*Camelus dromedarius*).** *Theriogenology*. 2005 June; 63(9): 2513-2522. ISSN: 0093-691X
NAL call no.: QP252.A1T5
Abstract: The dromedary embryos, collected at hatched blastocyst stage, survived freezing and thawing in the presence of a high concentration of ethylene glycol (7.0 mol/L) with sucrose (0.5 mol/L) and direct plunging in liquid nitrogen. The rate of survival, as judged by the morphological appearance of the embryos after thawing, was high (92%). The transfer of frozen-thawed embryos into the recipients during the breeding (n = 20) and non-breeding season (n = 25) resulted in two and one pregnancy, respectively. One of the two pregnant recipients, with embryos transferred during the breeding season, delivered a normal healthy male calf at term. To our knowledge, this offspring is the first camelid produced following transfer of a frozen-thawed embryo.
Descriptors: dromedaries, embryo transfer, cryopreservation, pregnancy rate, United Arab Emirates.

Saidabadi, Mohammad Sadegh. **Clinical pregnancy diagnosis in dromedary camel**. *Biology of Reproduction.* 2004; (Sp. Iss. SI): 118. ISSN: 0006-3363. Note: "37th Annual Meeting of the Society for the Study of Reproduction, Vancouver, Canada; August 01-04, 2004."
URL: http://www.biolreprod.org/
Descriptors: dromedary camels, females, pregnancy status, pregnancy, clinical diagnosis, diagnostic techniques.

Skidmore, JA; Billah, M. **Assisted reproduction in dromedary camels.** In: B. Faye and P. Esenov. *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 115-120. ISBN: 1586034731

Abstract: This study was conducted to investigate artificial insemination (AI) and embryo transfer of fresh, cooled and frozen camel embryos. Ejaculates were collected from male camels using an artificial vagina and diluted 1:1 (v:v) in Green buffer, before a total of 300x106 live sperm were inseminated into each female camel 24 h after injection (i.v.) with 20 micro g of the GnRH analogue, buserelin, to make them ovulate. More ejaculates were collected, diluted in Green Buffer and stored in an Equitainer (Hamilton Thorn, Canvers, MA, USA) at 4 degrees C for 24 h before insemination. While pregnancy rates of 50-60% were achieved with camels inseminated with fresh diluted semen, the conception rate decreased to 25% in camels inseminated with semen cooled for 24 h. For embryo transfer, donor camels were treated with a combination of 2500 IU of equine chorionic gonadotropin (eCG) and 400 mg of porcine follicle stimulating hormone (pFSH). When the follicles had matured to between 1.3-1.8 cm in diameter, the camel was mated, and the uterus was flushed non-surgically 8 days later. The recovered embryos were either directly transferred non-surgically into recipient camels at day 6 after ovulation, cooled in embryo flushing media for 24 h in an Equitainer at 4 degrees C before transfer, or deep-frozen using 1.5 M ethanediol as the cryoprotectant and using slow, controlled-rate cooling methods before thawing, rehydrating and transferring into recipient camels. A pregnancy rate of 67% was obtained after transfer of fresh embryos into day 6 recipients, which was similar to that obtained after transfer of embryos cooled for 24 h at 4 degrees C (63%). However, the pregnancy rate was reduced to 32% after transfer of frozen/thawed embryos into the recipient animals. Using assisted reproduction techniques, it was possible to increase the number of offspring from desirable genetic combinations. Reproduced with permission of CAB.
Descriptors: dromedary camels, ovulations, AI, artificial insemination, conception rate, pregnancy rates, embryos, cryopreservation, cryoprotectants, embryo transfer, FSH, GnRH, spermatozoa, buserelin, equine chorionic gonadotropin, gonadoliberin, GnRH, gonadotropin releasing hormone.

Skidmore, JA; Billah, M; Loskutoff, NM. **Comparison of two different methods for the vitrification of hatched blastocysts from the dromedary camel (*Camelus dromedarius*).** *Reproduction, Fertility and Development*. 2005; 17(5): 523-527. ISSN: 1031-3613
URL: http://www.publish.csiro.au/nid/44/paper/RD04082.htm
DOI: http://dx.doi.org/10.1071/RD04082
Abstract: The uteri of 32 donor camels were flushed non-surgically on Day 6, 7 or 8 after ovulation and a total of 184 embryos was recovered. Sixty Day 6 embryos and 61 Day 7 embryos were vitrified or frozen ultrarapidly using open pulled straws and a modified version of the Vajta protocol. These embryos were subjected to concentrations of either 10% and 20% or 20% and 40% ethanediol as the cryoprotectant before being loaded into open pulled straws (OPS) and plunged into liquid nitrogen. All embryos were subsequently thawed and rehydrated either directly into holding media or into holding media containing 0.2 M sucrose and were incubated for 5 or 10 min before being transferred to holding media before transfer to recipients. Although the survival rate of the embryos immediately after thawing was high (OPS 20%/40% ethanediol resulted in 97% and 100% survival for Day 6 and Day 7 embryos, respectively; OPS 10%/20% ethanediol resulted in 90% and 70% survival for Day 6 and Day 7 embryos, respectively), after 2 h in culture, survival rates had decreased to 46% and 53% for Day 6 and Day 7 embryos, respectively, using OPS 10%/20% and 53%

and 63% for Day 6 and Day 7 embryos, respectively, using OPS 20%/40%; however, none of the embryos transferred resulted in a viable fetus. A further 63 embryos (Day 6: n=31; Day 7: n=16; Day 8: n=16) were subsequently exposed to vitrification solution (20% glycerol+20% ethylene glycol+0.3 M sucrose+0.375 M glucose+3% polyethylene glycol) in three steps and after loading into 0.25 mL straws were plunged into liquid nitrogen. However, a much greater percentage of the Day 7 and Day 8 embryos (43.8% and 81.2% respectively) were fractured or torn after warming and none of the 12 intact embryos transferred resulted in a pregnancy. Better survival rates immediately after thawing and rehydration were obtained with the smaller Day 6 embryos (94%), which resulted in a total of eight fetuses from the 21 embryos transferred. Reproduced with permission of CAB.
Descriptors: dromedary camels, fetus, blastocyst, cryopreservation, cryoprotectants, embryo transfer, embryos, methodology, survival, vitrification.

Skidmore, JA. **Reproduction in dromedary camels: an update.** *Animal Reproduction***.** 2005; 2(3): 161-171. ISSN: 1806-9614
URL: http://www.cbra.org.br
Abstract: This review summarizes recent developments in camel reproduction, and it describes characteristics of the ovarian follicular wave cycle and exogenous hormonal control of ovulation and luteolysis. In addition, an account is given of the developments in assisted reproductive technologies in camels such as methods for collection, transfer, and deep-freezing of embryos and semen. Details of recent advances in in vitro maturation and fertilization of camel oocytes are also discussed.
Descriptors: dromedary camels, artificial insemination, blastocyst, cryopreservation, freezing embryos. embryo transfer, embryos, flunixin, GnRH, hormonal control, in vitro culture, in vitro fertilization, luteolysis, oocyte maturation, oocytes, ovaries, ovarian follicles, ovaries, ovulation, pregnancy, pregnancy rate, progesterone, reproduction, sampling, semen, semen preservation, superovulation, synchronization, techniques, endocrine control, gestation, gonadoliberin, gonadotropin releasing hormone, hormonal regulation, meclofenamic acid, sampling techniques.

Skidmore, JA; Billah, M. **Embryo transfer in the dromedary camel (*Camelus dromedarius)* using asynchronous, meclofenamic-acid treated camels as recipients.** In: M Alvarenga and JF Wade (Editors). *Havemeyer Foundation Monograph Series.* 2005; (14): 97-98. ISSN: 1472-3158. Note: "Proceedings of the 6th International Symposium on Equine Embryo Transfer, Rio de Janeiro, Brazil, 4-6 August 2004."
URL: http://www.havemeyerfoundation.org/monograph.htm
Abstract: This study shows the use of camels treated with meclofenamic acid (a prostaglandin synthase inhibitor) during the luteal phase, as asynchronous recipients for embryo transfer. A total of 8/10 (80%) Day 8, 6/10 (60%) Day 10 and 7/10 (70%) of Day 12 recipients were diagnosed pregnant by ultrasonography of the uterus on Day 20 of gestation. This was subsequently confirmed by the detection of a fetal heartbeat between Days 27-30 of gestation. Reproduced with permission of CAB.
Descriptors: dromedary camels, embryo transfer, embryos, embryo recipients, enzyme inhibitors, pregnancy rate, prostaglandin synthase, recipients, treatment, meclofenamic acid.

Skidmore, JA; Billah, M. **Embryo transfer in the dromedary camel (*Camelus dromedarius*) using asynchronous, meclofenamic acid-treated recipients.** *Reproduction, Fertility and Development.* 2005; 17(4): 417-421. ISSN: 1031-3613

DOI: http://dx.doi.org/10.1071/RD04081

Abstract: A total of 40 (Day 7) embryos were recovered from the uteri of 10 superovulated camels. Recipient camels (n=30) were prepared by injection with 20 micro g of the gonadotrophin-releasing hormone analogue buserelin (i.v.) to induce ovulation and then treatment with 1 g meclofenamic acid (a prostaglandin synthetase inhibitor), orally, once on Day 7 and twice daily on Days 8 and 9 after ovulation and thereafter at a dose of 1 g day-1 until 8 days after embryo transfer. Embryos were transferred into recipients on Day 8 (n=10), Day 10 (n=10) or Day 12 (n=10) after ovulation and another 10 embryos were transferred into untreated recipients on Day 8 after ovulation as controls. In addition, serum samples from all recipient camels were recovered daily throughout the period of meclofenamic acid administration and for a further 7 days after treatment had ceased and were assayed for progesterone concentrations. Results showed that whereas only one of 10 of the control group of recipients (10%) was diagnosed pregnant, a total of eight of 10 Day 8 (80%), six of 10 Day 10 (60%) and seven of 10 Day 12 (70%) recipients were diagnosed pregnant by ultrasonography 12 days after the embryo had been transferred. Subsequently, however, four pregnancies were lost when the conceptus was aged between 22 and 60 days, but this is not considered above the early fetal mortality rate expected in camels after natural mating or after transferring camel embryos to untreated recipients. Serum progesterone concentrations remained elevated, above 2 ng mL-1, throughout the period of meclofenamic acid administration in all recipient camels; thereafter, concentrations remained above 2 ng mL-1 in pregnant animals, whereas in non-pregnant camels concentrations had declined to baseline values (<1 ng mL-1) within 3 days of the end of the treatment period. In conclusion, treatment of recipient camels with meclofenamic acid reduced the need for tightly timed synchrony between donor and recipient because pregnancies were established in recipients that had ovulated as much as 5 days ahead of the donor. Reproduced with permission of CAB.

Descriptors: dromedary camels, pregnancy, embryo transfer, embryos, ovulation, progesterone, uterus, gestation, GnRHa, meclofenamic acid.

Tajik, P; Puyan, MR; Zare Shahneh, A; Ghasemzadeh Nava, H; Mirshokraei, P. **In vitro maturation of dromedary camel oocytes in Hams's F10 medium supplemented with different concentrations of fetal bovine serum.** *Journal of the Faculty of Veterinary Medicine, University of Tehran*. 2005; 60(2): 143-148. ISSN: 1022-646X. Note: In Persian with an English summary.

Abstract: The objective of this study is to find out the percent of camel oocytes that will mature using Ham's F10 culture medium supplemented with different concentrations of fetal bovine serum. Oocytes from camels were isolated and transferred in TCM-199 and Ham's F10 supplemented with 0-10% heat inactivated fetal bovine serum (FBS) and cultured for 24 h in CO< sub>2</ sub> incubator. After culture, the oocytes were then mounted on a glass slide and fixed and stained for evidence of maturation. Results showed that oocytes from fresh ovaries that were cultured in Ham's F10 without protein supplements resulted in only 17.65% matured oocytes. However, significant (P<0.05) higher oocytes reached maturity at 5 and 10% FBS at 36.84% and 33.33% matured oocytes respectively. Results also showed

that cooling of ovaries prior to culture results to oocyte maturation, 14.54% of the oocytes matured without FBS while 25.86% and 33.33% matured oocytes were recorded from the 5% and 10% supplemented culture media respectively.
Descriptors: dromedary camels, oocytes, maturing oocytes in vitro, in vitro fertilization, bovine serum albumin, culture media.

Wani, NA; Nowshari, MA. **Kinetics of nuclear maturation and effect of holding ovaries at room temperature on in vitro maturation of camel (*Camelus dromedarius*) oocytes.** *Theriogenology*. 2005 July 1; 64(1): 75-85. ISSN: 0093-691X
NAL call no.: QP251.A1T5
Abstract: Experiments were conducted to investigate kinetics of in vitro nuclear maturation and the effect of storing ovaries at room temperature on initial chromatin configuration and in vitro maturation of dromedary camel oocytes. Cumulus oocyte complexes (COCs) were collected from slaughterhouse ovaries and matured in vitro for 4-48 h. At every 4 h interval (starting from 0 to 48 h), groups of oocytes were fixed, stained and evaluated for the status of nuclear chromatin. Oocytes were categorized as germinal vesicle (GV), diakinesis (DK), metaphase-I (M-I), anaphase-I (A-I), metaphase-II (M-II) stage and those with degenerated, fragmented, activated or without a visible chromatin as others. At the start of culture, 74% (66/89) oocytes were at GV stage, 13% (12/89) at DK and 12% (11/89) were classified as others. Germinal vesicle breakdown started spontaneously in culture and at 20 h of culture 97% oocytes had already completed this process. After 8 and 16 h of maturation the highest proportion of oocytes (42%, 48/114 and 41%, 51/123) were at DK and M-I stage, respectively. The proportions of oocytes reaching M-II stage at 32 (42%, 50/118), 36 (45%, 47/104), 40 (49%, 57/117), 44 (52%, 103/198) and 48 h (46%, 55/120) of culture were not different from each other ($P > 0.05$). The proportion of oocytes categorized as others, however, increased after 40 h of culture and was higher ($P < 0.05$) at 48 h compared with other maturation periods. There was no difference ($P > 0.05$) in the proportion of oocytes reaching M-II stage from the ovaries collected and stored in normal saline solution (NSS) at room temperature for 12 h (43%, 64/148) and those collected in warm NSS (37 degrees C) and processed immediately after arrival in laboratory (49%, 57/117). However, low number of oocytes reached M-II stage from ovaries collected in warm NSS but stored at room temperature (29%, 37/128) compared with other two groups ($P < 0.05$). It may be concluded that dromedary oocytes require 32-44 h of in vitro culture to have an optimum number of oocytes in M-II stage. However, further studies are required to find out the most appropriate maturation period, which will result in the further development of these oocytes after IVF, ICSI, parthenogenetic activation or nuclear transfer. Ovaries can be collected and stored in normal saline solution at room temperature for 12 h without any appreciable effect on the nuclear maturation of the oocytes.
Descriptors: dromedary camels, meiosis, cumulus oophorus, cell nucleus, storage temperature.

2004

Aminu Deen; Sumant Vyas; Mamta Jain; Sahani, MS. **Refrigeratory preservation of camel semen.** *Journal of Camel Practice and Research.* 2004; 11(2): 137-139. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A total of 28 semen samples were collected from 6 male dromedaries. Each ejaculate was split into 2 and extended with Tris and Biociphos dilutors, respectively. The semen samples were extended at room temperature and were slowly cooled to 4 degrees C. The individual sperm motility was recorded at 0, 24, 48, 72, 96 and 120 h or until the motility ceased. It was shown that none of the samples extended in Biociphos could retain motility at 24 h after collection, while 11 (39.28%), 10 (35.71%), 5 (17.85%) and 3 (10.71%) semen samples extended in Tris could retain motility for 24, 48, 72 and 96 h, respectively. The study was then continued with Tris buffer and 66 more semen samples (totalling 94) were extended and evaluated for preservability of sperm motility. 76 (80.85%), 35 (37.23%), 25 (26.59%), 9 (9.57%), 5 (5.32%) and 1 (1.06%) samples extended in Tris could retain motility for 0, 24, 48, 72, 96 and 120 h, respectively. In conclusion, Biociphos is not a suitable extender for preservation of camel semen and preservability is also low in Tris extender. The composition of Tris buffer needs to be modified for improving preservability of camel semen. Reproduced with permission of CAB.
Descriptors: dromedary camels, semen preservation, semen diluents additives, tris, biociphos, refrigeration, AI, artificial insemination, sperm motility.

Basiouni, GF. **Relationship between concentrations of ovarian steroids and insulin-like growth factor-I in the follicular fluids of the camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 176-180. ISBN: 8190114123
Descriptors: dromedary camels, female camels, estradiol, follicular fluid, hormone secretion, insulin like growth factor, estrogens, ovarian follicles, ovaries, somatomedin C, steroids, testosterone, sulfation factor, sulphation factor.

Gordon, I. **Pregnancy testing technology.** I. Gordon. *Reproductive Technologies in Farm Animals.* CABI Publishing, Wallingford, UK. 2004; 215-235. ISBN: 0851998623
Abstract: This chapter deals with several aspects of pregnancy testing in livestock. The advantages of pregnancy testing are presented as well as the factors affecting the establishment of pregnancy. The different methods of pregnancy testing (palpation per rectum, progesterone and oestrogen assays, faecal testing, predicting litter size, use of ultrasonics, early dipstick tests, radiography and detection of gonadotropins) are discussed. Reproduced with permission of CAB.
Descriptors: cattle, deer, dromedary camels, goats, horses, pigs, sheep, gestation, pregnancy testing, corpus luteum, embryos, environmental factors, enzyme immunoassay, epidermal growth factor, feces, glycoproteins, gonadotropins, immunology, interferon, litter size, maternal recognition, estrogens, estrus, palpation, placenta, PMSG, progesterone, prostaglandins, radiography, radioimmunoassay, survival, transforming growth factor, ultrasound, dipstick assay, immunoradiometric assay, PMG, pregnant mare serum gonadotropin, radioimmunosorbent assay.

Hadj Khatir; Abdelhaq Anouassi; Tibary, A. **Production of dromedary (*Camelus dromedarius*) embryos by IVM and IVF and co-culture with oviductal or granulosa cells.** *Theriogenology*. 2004; 62(7): 1175-1185. ISSN: 0093-691X

NAL Call no.: Qp251.A1T5

Abstract: The general objective of this work was to produce dromedary embryos from cumulus-oocyte complexes (COCs) that were matured, fertilized and co-cultured in vitro. A total of 1598 COCs were recovered from 457 ovaries; 1308 were deemed suitable for IVM and were cultured at 38.5 degrees C, 5% CO< sub>2</ sub>, and >95% humidity for 36 h in TCM-199 supplemented with 10% heat-treated fetal calf serum (FCS), 10 ng/ml epidermal growth factor (EGF), 1 micro g/ml FSH, and 500 micro M cysteamine. Matured COCs (n=88) were denuded, fixed, and stained to determine nuclear status; 63% (56/88) had reached metaphase II (MII) at 36 h. Overall, 1135 COCs were inseminated with ejaculated fresh semen (0.5x106 spermatozoa/ml in modified TALP-solution). Inseminated oocytes (n=155) were examined for evidence of fertilization; 68% (106/155) were penetrated by spermatozoa, including 52% (55/106) with two pronuclei and 34% (36/106) with polyspermy. Inseminated, denuded oocytes (n=819) were co-cultured with dromedary oviductal epithelial or granulosa cells in TCM-199 supplemented with 10% heat-treated FCS. Although the rate of first cleavage (two to eight cells) was similar for the two co-culture systems (32 versus 33%, respectively), more embryos (two-cell to blastocyst stage) were obtained from oocytes co-cultured with oviductal versus granulosa cells (61 versus 45%; P<0.05). The proportions of fertilized oocytes developing to the early morula stage were 19% (80/417) and 12% (48/402) for oocytes co-cultured for 7 days with oviductal or granulosa cells, respectively (P>0.05). However, development to the blastocyst stage (10% of fertilized oocytes) occurred only in oocytes co-cultured with oviductal cells. In conclusion, dromedary embryos were produced in vitro using abattoir-derived oocytes, fresh (ejaculated) semen, and oviductal cell co-culture. Reproduced with permission of CAB.

Descriptors: dromedary camels, oocytes, culture techniques, cumulus oophorus, embryo culture, granulose cells, in vitro culture, in vitro fertilization, oviducts, uterine tubes, semen, fallopian tube, salpinges.

Ismail, ZB; Qureshi, T; Levy, M; Khamas, W; Nour, A. **Preliminary report on some physiological parameters in pregnant female camels (*Camelus dromedarius*) in North America.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 115-122. ISBN: 8190114123

Descriptors: dromedary camels, pregnant female, physiological parameters of pregnancy, reproductive hormone secretion, progesterone, hydrocortisone, insulin, thyroxine, triiodothyronine, alkaline phosphatase, aspartate aminotransferase, blood chemistry, gamma glutamyltransferase, hematology, L iditol dehydrogenase, North America.

Khadjeh, GH. **Concentration of serum proteins in pregnant and nonpregnant Iranian one-humped camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 91-93. ISBN: 8190114123

Descriptors: dromedary camels, gestation, gamma globulins, blood chemistry, blood proteins, globulins, immunoglobulins, normal values, pregnancy, serum albumin, Iran.

Khatir, H; Anouassi, A; Tibary, A. **Production of dromedary (*Camelus dromedarius*) embryos by IVM and IVF and co-culture with oviductal of granulosa cells.** *Theriogenology*. 2004 Oct 1; 62(7): 1175-1185. ISSN: 0093-691X

NAL call no.: Qp251.A1T5

Abstract: The general objective of this work was to produce dromedary embryos from cumulus-oocyte complexes (COCs) that were matured, fertilized and co-cultured in vitro. A total of 1598 COCs were recovered from 457 ovaries; 1308 were deemed suitable for IVM and were cultured at 38.5 degrees C, 5% CO2, and >95% humidity for 36 h in TCM-199 supplemented with 10% heat-treated fetal calf serum (FCS), 10 ng/ml epidermal growth factor (EGF), 1 microgram/ml FSH, and 500 micromolar cysteamine. Matured COCs (n = 88) were denuded, fixed, and stained to determine nuclear status; 63% (56/88) had reached metaphase II (MII) at 36 h. Overall, 1135 COCs were inseminated with ejaculated fresh semen (0.5 x 10(6) spermatozoa/ml in modified TALP-solution). Inseminated oocytes (n = 155) were examined for evidence of fertilization; 68% (106/155) were penetrated by spermatozoa, including 52% (55/106) with two pronuclei and 34% (36/106) with polyspermy. Inseminated, denuded oocytes (n = 819) were co-cultured with dromedary oviductal epithelial or granulosa cells in TCM-199 supplemented with 10% heat-treated FCS. Although the rate of first cleavage (two to eight cells) was similar for the two co-culture systems (32 versus 33%, respectively), more embryos (two-cell to blastocyst stage) were obtained from oocytes co-cultured with oviductal versus granulosa cells (61 versus 45%; P < 0.05). The proportions of fertilized oocytes developing to the early morula stage were 19% (80/417) and 12% (48/402) for oocytes co-cultured for 7 days with oviductal or granulosa cells, respectively (P > 0.05). However, development to the blastocyst stage (10% of fertilized oocytes) occurred only in oocytes co-cultured with oviductal cells. In conclusion, dromedary embryos were produced in vitro using abattoir-derived oocytes, fresh (ejaculated) semen, and oviductal cell co-culture.

Descriptors: dromedary camels, in vitro fertilization, embryo culture, meiosis, embryogenesis, culture media, in vitro maturation.

Mahamat, H; Mukani, WO; Mboloi, MM; Guya, SO; Krombaritis, GE. **Pregnancy diagnosis in the dromedary camel (*Camelus dromedarius*) based on a competitive progesterone enzyme linked immunosorbent assay (ELISA).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 660-664. ISBN: 8190114123

Descriptors: dromedary camels,pregnancy diagnosis, analytical methods, blood chemistry, diagnostic techniques, ELISA, pregnancy, progesterone levels, gestation.

Saleh , MA; El Sokkary, GH; Abdel Razik, ARK. **Circulating steroids and proteins in Egyptian oasis pregnant camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 139-146. ISBN: 8190114123

Descriptors: dromedary camels, females, pregnancy, progesterone, parturition, estrogens, blood-chemistry, blood proteins, globulins, hormone secretion, hydrocortisone, cortisol, endocrine secretion immunoglobulins, oases, serum albumin, steroids, Bedouins, Egypt.

Salem , HAH; Serur, BH; Amer, HA. **Estradiol, progesterone and thyroxine in follicular fluids of normal, cystic and atretic follicles of nonpregnant camels in Saudi Arabia.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 218-222. ISBN: 8190114123
Descriptors : estradiol, progesterone, thyroxine, non-pregnant females, blood-chemistry, cystic and atretic follicles, follicular fluid, pathological, hormone secretion, ovarian cysts, ovarian follicles, ovaries, progesterone, Saudi Arabia.

Skidmore, JA; Billah, M; Loskutoff, NM. **Developmental competence in vitro and in vivo of cryopreserved, hatched blastocysts from the dromedary camel (*Camelus dromedarius*).** *Reproduction, Fertility and Development.* 2004; 16(6): 605-609. ISSN: 1031-3613
URL: http://www.publish.csiro.au/nid/44/paper/RD03094.htm
DOI: http://dx.doi.org/10.1071/RD03094
Abstract: The present paper describes experiments designed to investigate methods for cryopreserving embryos from dromedary camels. Since preliminary studies had shown that ethanediol to be the best cryoprotectant for camel embryos, the current experiments were performed to determine the minimum exposure time to 1.5 M ethanediol required to achieve cryoprotection. The uteri of 30 donor camels were flushed non-surgically 8 days after mating. Embryos were recovered and 158 were assigned to one of three groups, which were exposed to 1.5 M ethanediol for either 10 (n=67), 5 (n=51) or 1 min (n=40). The embryos were subsequently thawed and rehydrated by expelling either directly into holding medium (HM; HEPES-buffered Tyrode's medium containing sodium lactate and 3 mg/ml bovine serum albumin, 10% fetal calf serum, 100 IU/ml penicillin G, 100 micro g/ml streptomycin and 25 micro g/ml amphotericin B) or initially into HM containing 0.2 M sucrose for 5 or 10 min. The survival rate of all embryos immediately post-thawing, as judged by the morphological appearance of the embryos, was high (91%), but was greatly reduced after 2 h culture (59%). A total of 92 embryos were transferred to recipient camels resulting in 18 viable fetuses (1 min ethanediol exposure, n=1:15; 5 min ethanediol exposure, n=3:34; 10 min ethanediol exposure, n=14:43). Among the embryos rehydrated directly in HM, 6 of 65 resulted in viable fetuses and those rehydrated initially in 0.2 M sucrose for 5 or 10 min resulted in 9 of 47 and 3 of 46 fetuses, respectively. It is concluded that camel embryos can be cryopreserved using ethanediol as a cryoprotectant when the embryos are cooled slowly (to 33 degrees C) before being plunged into liquid nitrogen for storage. Reproduced with permission of CAB.
Descriptors: dromedary camels, blastocyst, cryopreservation, ethanediol, cryoprotectants, embryos, developmental competence, fetus, survival, reviews, survival.

Sumant Vyas; Rai, AK; Sahani, MS; Khanna, ND. **Use of real-time ultrasonography for control of follicular activity and pregnancy diagnosis in the one humped camel (*Camelus dromedarius*) during the non-breeding season.** *Animal Reproduction Science*. 2004; 84(1/2): 229-233. ISSN: 0378-4320
NAL call no .: QP251.A5
Abstract: Ovaries of 16 adult pleuriparous, non-pregnant and non-lactating one humped female camels (Camelus dromedarius) belonging to National Research Centre on Camel, at Bikaner, India, were examined for the presence of follicular activity (< =0.5 cm diameter)

using real-time ultrasonography during June-August, which is considered to be non-breeding season in India. Follicles >=1.0 cm diameter were found in eight females. These animals were mated with virile studs. In four out of eight camels pregnancy was confirmed by progesterone assay and ultrasonography. The study shows that pre-ovulatory follicle may develop in some female camels during June-August (non-breeding season in India) and successful pregnancies may be achieved after mating of individual animals during this period. Reproduced with permission of CAB.
Descriptors: dromedary camels, pregnancy, pregnancy diagnosis, breeding season, hormonal control, ovarian follicles, ovaries, ovulation, progesterone, ultrasonography, India.

Tajik, P; Hamali, H; Ghasemzedeh-Nava,H; Mokhber-Dezfouli, MR. **Camel cauda epididymal sperm motility in BO medium with caffeine and heparin.** In: CTNF Iskandar; L Hassan; GK Dhaliwal; R Yusoff; AR Omar; MAKG Khan (Editors). *Animal Health: A Breakpoint in Economic Development? The 11 th International Conference of the Association of Institutions for Tropical Veterinary Medicine and 16 th Veterinary Association Malaysia Congress, 23-27 August 2004, Petaling Jaya, Malaysia.* 2004; 362-363. ISBN: 9832871662
Abstract: Dromedary camel testicles (n=100) were obtained from slaughterhouses, and cauda epididymides were incised in the laboratory. The sperm cells were transferred into BO medium supplemented with 0.1% polyvinyl alcohol and containing caffeine and/or heparin. Sperm cells were diluted to a final concentration of 2-4_106 cells under warm paraffin oil. Sperm motility was assessed under the 200_magnification under a light microscope. Approximately 80% of epididymal sperm cells from cauda epididymis were motile at the start of observation. The motility decreased and reached to almost zero during 6 h incubation in BO medium. No significant difference was observed among different concentrations of fetal calf serum (FCS). When caffeine or heparin was present in BO medium significantly higher ($P<0.05$) sperm motility was observed after 6 hours incubation. Sperm motility were 70, 67 and 42 for BO+caffeine+heparin, Bo+caffeine and BO+heparin respectively. The results of the present experiment indicated that FCS is not an appropriate supplement to support camel caudal epididymal sperm motility. However, caffeine and caffeine+heparin may be of value to maintain sperm motility in vitro. Reproduced with permission of CAB.
Descriptors: dromedary camels, caffeine, epididymis, heparin sulfate, spermatozoa, sperm, semen diluent additives, semen diluents, testes, sperm motility, testicles.

Vyas, S; Rai, AK; Goswami, PK; Singh, AK; Sahani, MS; Khanna, ND. **Superovulatory response and embryo recovery after treatment with different gonadotrophins during induced luteal phase in *Camelus dromedarius*.** *Tropical Animal Health and Production.* 2004 Aug; 36(6): 557-565. ISSN: 0049-4747. Note: Summaries in French and Spanish.
Descriptors: dromedaries, superovulation, gonadotropins, embryo transfer, follicle stimulating hormone, FSH.

Vyas, S; Rai, AK; Sahani, MS; Khanna, ND. **Use of real-time ultrasonography for control of follicular activity and pregnancy diagnosis in the one humped camel (*Camelus dromedarius*) during the non-breeding season.** *Animal Reproduction Science.* 2004 Aug; 84(1-2): 229-233. ISSN: 0378-4320
NAL call no: QP251.A5

Descriptors: dromedaries, camels, pregrancy diagnosis, untrasonography, follicular activity, non-breeding season.

Vyas, S; Rai, AK; Goswami, PK; Singh, AK; Sahani, MS; Khanna, ND. **Superovulatory response and embryo recovery after treatment with different gonadotrophins during induced luteal phase in *Camelus dromedarius*.** *Tropical Animal Health and Production*. 2004; 36(6): 557-565. ISSN: 0049-4747. Note: In English with a French summary.
DOI: http://dx.doi.org/10.1023/B:TROP.0000040931.32605.30
NAL call no : SF601.T7
Abstract: Superovulation, embryo recovery and transfer were attempted in 19 dromedary camels of about 6-10 years of age, and having calved at least once. Superovulation was done using two commercially available porcine FSH preparations, FSH-I (11 donors) and FSH-2 (8 donors) during a luteal phase created by inducing ovulation with hCG. The superovulatory response was assessed by ultrasonography. The embryo recovery was attempted non-surgically in sitting position on day 8 and day 7 after first mating in one FSH-1 and one FSH-2 group, respectively. Considerable individual variation in response to the superovulatory stimulus was observed. No significant difference was observed between the two groups in terms of superovulatory response and embryo recovery ($p>0.05$). In total 30 embryos were recovered from 17 donors (1.51 embryos/donor). Recipients were synchronized with donors using hCG. Eight embryos were transferred, resulting in two pregnancies and live births. Reproduced with permission of CAB.
Descriptors: dromedary camels, female camels, superovulation,embryo recovery, embryo transfer, pregnancy, birth, corpus luteum, FSH, gonadotropins, HCG, ovulation, synchronization.

Zhao, XX; Chen, BX. **Peripartal endocrine changes in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 223-226. ISBN: 8190114123
Descriptors: dromedary camels, gestation, pregnancy, parturition, blood chemistry, endocrine glands, estradiol, hormone secretion, hydrocortisone, progesterone, cortisol, ductless glands, endocrine secretion, estradiol.
Descriptors: alpacas, Bactrian camels, dromedary camels, guanacos, llamas, vicunas, reproductive techniques, artificial insemination, cryopreservation, deposition site, gonadotropin releasing hormone, GnRH, HCG, estrus, ovulation, synchronization, synchronized females, techniques, spermatozoa, semen, semen diluent additives, semen preservation.

Arabian: Veterinary Care

2009

DesCoteaux, Luc; Colloton, J; Gnemmi, Giovanni (Editors). ***Practical Atlas of Ruminant and Camelid Reproductive Ultrasonography.*** Published by Wiley and Black. 2009. 244 p. ISBN: 978-0-8138-1551-0.

Descriptors: ruminants, camelids, ultrasound methods, image-based guide, reproductive ultrasound applications, advanced techniques, fetal sexing, embryo transfer, color Doppler technologies, practitioner-oriented.

2008

Bekele, Samuel T. **Gross and microscopic pulmonary lesions of camels from Eastern Ethiopia.** *Tropical Animal Health and Production.* 2008 Jan; 40(1): 25-28. ISSN: 0049-4747

URL: http://dx.doi.org/10.1007/s11250-007-9046-9

NAL call no: SF601 .T7

Abstract: Camels are important animals for pastoralists in the northeastern, eastern, south-eastern and southern parts of Ethiopia. This paper reports on abattoir study of respiratory lesions in 104 adult camels at the Dire Dawa abattoir (88 male and 16 female). The study showed 98% of the examined lungs had one or more lesions. The most common lesions were pulmonary fibrosis (50.00%), pneumoconiosis (34.62%), hydatid cyst (30.80%), pulmonary abscess (3.85%) and parasitic bronchopneumonia (0.96%). The distribution of pneumoconiosis and hydatid cyst varied significantly ($p < 0.05$) among different lobes, the highest being seen in the caudal lobe. For the different lesions there was no significant ($p > 0.05$) difference in distribution among male and female camels. Possible explanations for the occurrence of the lesions are discussed. And recommendations forecasted are made.

Descriptors: camels, adult animals, post slaughter sampling, respiratory lesions, pulmonary fibrosis (50.00%), pneumoconiosis (34.62%), hydatid cyst (30.80%), pulmonary abscess (3.85%), parasitic bronchopneumonia, Ethiopia.

Birincioglu, SS; Avc, H; Aydogan, A. **Seminoma and cholangiocarcinoma in an 18-year-old male camel.** *Turkish Journal of Veterinary and Animal Sciences.* 2008; 32(2): 141-144. ISSN: 1300-0128. Note: In English with a summary in Turkish.

URL: http://journals.tubitak.gov.tr/veterinary/

Abstract: Herein, diffuse-type seminoma and intrahepatic cholangiocarcinoma in an 18-year-old male camel is discussed. The seminoma was located on the right testis (11x8.5x4.5 cm) and the cut surface of the tumour had a lobulated appearance. The tumour cells disseminated diffusely in the tumoral stroma with haemorrhages, and multiple necrotic foci were seen with microscopic examination. Additionally, the liver was enlarged, firm, and grayish-white; multiple lesions were observed both on the serosal surface and in the cut surface of the liver. Microscopically, the intrahepatic cholangiocarcinoma was composed of gland-like structures

and/or solitary islands of neoplastic cells in the tumoral stroma. This is the first reported case of 2 tumors simultaneously occurring in a camel. Reproduced with permission of CAB.
Descriptors: dromedary camels**,**carcinoma, case reports, intrahepatic diffuse cholangiocarcinoma, bleeding, clinical aspects, hemorrhage, histopathology, liver, neoplasms, testes, testicles, tumor stroma.

Kamal, AM. **Some biochemical, hematological and clinical studies of selected ruminal and blood constituents in camels affected by various diseases.** *Research Journal of Veterinary Sciences.* 2008; 1(1): 16-27. ISSN: 1819-1908
URL: http://www.academicjournals.net/fulltext/rjvs/2008/16-27.pdf
Abstract: Selected ruminal and blood constituents were investigated in a group of 71 dromedary camels suffering from various diseases including Trypanosomiasis (n=5), Mange (n=4), Pasteurolesis (n=10), contagious skin disease (n=5), Inflammation of soft palate (n=3), bloat (n=4), indigestion (n=10), Ruminal acidosis (n=10) and normal camels (n=20). Our investigations showed significant changes in ruminal pH, ruminal ammonia nitrogen, RVFA, ruminal calcium, sodium, potassium, RBCs, Hb, MCV, MCH, neutrophil % eosinophil %, basophil %, serum total protein, albumin, urea, creatinine and uric acid in ruminal acidosis group. While in Trypanosomiasis, Pasteurolesis groups, there is changes in ruminal ammonia nitrogen, ruminal total protein, ruminal urea, ruminal calcium, potassium, inorganic phosphorus (only in trypanosomiasis) and ruminal Choloride, Eosinophil %, basophil %, serum total protein and albumin. But in indigestion group, changes in ruminal ammonia nitrogen, Ruminal total protein, ruminal choloride, Hb blood cell, MCV, MCHC, neutrophil %, Eosinophil %, basophil %, Lymphocyte %, serum total protein, albumin, calcium, Inorganic phosphorus, sodium, chloride and potassium. Inflammation of the soft palate group changes occur in ruminal ammonia nitrogen, ruminal total protein, ruminal urea, plasma RBCs, Hb, MCH, MCHC, neutrophil %, Eosinophil %, basophil %, serum total protein and albumin. While in frothy bloat group changes in ruminal pH, ruminal ammonia nitrogen, ruminal total protein, ruminal sodium, RBCs, Hb concentration, MCV, MCH, MCHC, neutrophil %, eosinophil %, basophil %, Lymphocyte %, calcium, Inorganic phosphorus, sodium, chloride and potassium. Also, contagious skin disease group changes in ruminal ammonia nitrogen, ruminal urea, ruminal choloride, RBCs, Hb concentration, MCH, MCHC, neutrophil %, eosinophil %, basophil %, monocyte % and serum calcium, inorganic phosphorus, sodium and chloride and potassium. But, mange group changes occur in ruminal ammonia nitrogen, ruminal total protein, ruminal urea, ruminal potassium, RBCs, Hb concentration, MCH, MCHC, neutrophil %, eosinophil % and basophil %. Reproducted with permission of CAB.
Descriptors: dromedary camels, *Trypanosoma* infections, protozoal diseases, trypanosomosis, acidosis, albumins, ammonia, animal diseases, bloat, blood chemistry, blood composition, blood plasma, calcium, constituents, creatinine, dyspepsia, ectoparasitoses, hematology, infections, inflammation, lymphocytes, mange, monocytes, palate, phosphorus, protozoal infections, research, skin diseases, sodium chloride, trypanosomiasis, urea, uric acid, indigestion.

Wilson, RT. **Perceptions and problems of disease in the one-humped camel in southern Africa in the late 19th and early 20th centuries.** *Journal of the South African Veterinary Association.* 2008; 79(2): 58-61. ISSN: 0038-2809

Descriptors: dromedary camels, introduction into Namibia for military purposes, camels introduced into South Africa and Rhodesia (Zimbabwe) to replace oxen, concerns regarding introductions of disease, foot and mouth disease, mange, trypanosomosis, antibodies to common livestock found in later years.

2007

Abou el Ella, AG. **Ultrasonographic images of the clinically normal mammary gland in one-humped camels (*Camelus dromedarius*).** *Veterinary Medical Journal Giza*. 2007; 55(1): 87-99. ISSN: 1110-1423. In English with an Arabic summary.

Abstract: The ultrasonographic images of clinically normal mammary glands of 14 one-humped she-camels were recorded using 5.0 and 7.5 MHz linear transducer. The obtained results were confirmed through dissection of three mammary gland samples obtained freshly from the slaughterhouse. The glandular parenchyma of the udder of non-lactating she-camels appeared uniformly hyperechoic than that of the lactating one. At the base of each quarter two distinct gland cisterns were seen shared, a common hyperechoic wall, while the cistern cavity appeared anechoic because of presence of milk. The teat wall was differentiated into four ultrasonographic layers. Each teat possessed two separate anechoic teat cistern separated with a hyperechoic connective tissue band and communicated with the outside of the teat with a separate streak canal, which appeared as a thin, hyperechoic line. We can conclude that ultrasonographic imaging of the mammary gland in one-humped camels is a noninvasive imaging technique which can be performed in both standing and recumbent positions. The teats of one-humped she camels possess only two cisterns and two separate streak canals like other Camelidae species. Moreover, the normal ultrasonographic pattern of the mammary gland will be helpful for further studies dealing with diagnosis of different mammary gland diseased conditions. Reproduced with permission of CAB.

Descriptors: dromedary camels, diagnosis, diagnostic techniques, mammary glands diseases, morphology, teats, ultrasonography.

Abshenas, J; Vosough, D; Masoudifard, M; Molai, MM. **B-mode ultrasonography of the udder and teat in camel (*Camelus dromedarius*)**. *Journal of the Faculty of Veterinary Medicine, University of Tehran.* 2007; 62(2): 27-31. ISSN: 1022-646X. Note: In English with a Persian summary.

Abstract: The aim of the present study was to determine the normal ultrasonographic features of the mammary gland and teats of lactating camels. Udders of ten camels were obtained from a local slaughterhouse. B-mode ultrasonographic examination of the udders in water bath by 6.5-8.5 MHz linear array transducer was performed. Normal sonographic findings were described and teat canal length, teat end width, teat wall thickness, teat cistern width and middle cistern wall thickness were also measured. Results were analysed by Paired sample t-test. In lactating camels, the streak canal, teat sinus, gland sinus and lactiferous ducts were imaged easily. The teat wall can be divided into 3 layers, including a hyperechoic

outer layer, a hypoechoic thicker middle layer and a less hyperechoic inner layer. The intercisternal wall of each teat can be divided into 3 layers: two thin hyperechoic outer layers and a thicker hypoechoic middle layer. The B-mode ultrasonography technique is reliable for determining the anatomic features of the udder and measuring teat parameters of camels.
Descriptors: dromedary camels, anatomy, diagnostic techniques, lactation, mammary glands, udders, teats, ultrasonography, normal values.

Ahmed, SM; Hegde, BP. **Preliminary study on the major important camel calf diseases and other factors causing calf mortality in the Somali Regional state of Ethiopia.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference " Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 31-41.
Abstract: This study was undertaken in 5 randomly selected districts of Aider zone. 15 households were selected from each district. A total of 75 households were included in this study. Random sampling technique was used. Calf mortality was seen as prenatal death due to abortion, postnatal death from first week to 3 months of calf age and before weaning period. The latter was mainly caused by some endemic diseases and other associated factors. In this study, the abortion rate was 16% and was caused by several factors. These included accidental death of fetus and trypanosomiasis, which contributed 64.3 and 28.6%, respectively, in the case of Jarati, whereas trypanosomiasis and stress conditions contributed 40 and 46.7%, respectively, in the case of Hargelle. On the other hand, stress conditions caused by adverse environmental conditions and unidentified poisonous plants contributed 26.7 and 73.3%, respectively, in the case of Barey. Similarly, trypanosomiasis, accidental death and stress conditions and browsing of poisonous plants contributed 33.3, 40.0, 20.0 and 6.7%, respectively, in the case of Dollo-Bay. With regard to El-kari district, about 66.7, 26.7 and 6.7% of respondents claimed that abortion was caused by accidental deaths, poisonous plants and stressful conditions, respectively. On the other hand, calf death was very high during the first week after birth. About 60, 50, 55, 45, 35% of Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggested that an average 51% of calf losses were encountered during the first week of calves. Calf mortality of about 30% was encountered during the first 90 days of calf age, whereas the remaining 19% were encountered after 90 days of calf life before weaning. Poor colostrum feeding practice was also believed to be one of the major causes of calf mortality during the first week of life. Furthermore, some endemic diseases and other associated factors were also reported to be among the major causes of calf mortality during the lactation period before weaning. The most important disease found was calf scour (daab). The morbidity and mortality rates of calf scour were 87 and 39%, respectively. Sunken eye (ilqod) was considered as the second problematic disease of calves by herders. The disease caused serious economic losses to the households through loss of milk after death of the calves. The morbidity and mortality rates due to sunken eyes were 57 and 12%, respectively. Contagious ecthyma (canbaruur) was considered as one of the important diseases of calves by herders. The morbidity and mortality rates of contagious ecthyma were 75 and 6.9%, respectively. Contagious necrotic skin was also considered as one of the important diseases of calves by herders. About 88% of all districts reported that the disease affected their calves with morbidity and mortality rates of 35 and 4.6%, respectively. Other endemic diseases reported were

trypanosomiasis with morbidity and mortality rates of 9.6 and 6.7%. Camel pox had morbidity and mortality rates of 42 and 7%, respectively. Pneumonia had a mortality rate of 7%. On the other hand, factors causing calf losses included predation which was about 4.8, 23.8, 26.6, 16.7, and 26.2% in Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggesting that predators were considered next to diseases in causing calf mortality. Reproduced with permission of CAB.
Descriptors: dromedarycamels, calves, fetal abortion, age differences, animal diseases, anthrax, camel milk, colostrum, deformities, diarrhea, losses *scarcoptes* mange, morbidity, mortalitynecrosis, pneumonia, poisoning, poisonous plants, predation, stress, toxicity, trypanosomiasis, viral diseases, *Bacillus anthracis*, Contagious ecthyma virus, plants, *Trypanosoma*, contagious pustular dermatitis, CPD virus, death rate, diarrhea, orf virus, scabby mouth, sore mouth, toxic plants, toxicosis, trypanosomosis, ulcerative dermatosis, viral infections, Abyssinia, Ethiopia.

Al Hizab, FA; Ramadan, RO; Al Mubarak, AI; Abdelsalam, EB. **Basal cell carcinoma in a one-humped camel (*Camelus dromedarius*) - a clinical report.** *Journal of Camel Practice and Research.* 2007; 14(1): 49-50. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camels, biopsy, basal cell carcinoma, cancers, clinical picture, case reports, clinical aspects, diagnosis, face, histopathology, neoplasms, surgery, Saudi Arabia.

Al Mujalli, MA. **Hematological and biochemical changes in camels affected by trypanosomiasis in Saudi Arabia.** *Veterinary Medical Journal Giza.* 2007; 55(1): 155-159. ISSN: 1110-1423
Abstract: The haematological and serum biochemical profiles of 18 dromedary camels in Saudi Arabia with clinical signs of diarrhoea, emaciation, anaemia and high body temperature and suspected as having trypanosomiasis were analysed. It was shown that 10 (55.6%) camels were positive for the disease, while 8 (44.4%) were negative. The mean values of erythrocyte count, haemoglobin and haematocrit were lower, while leukocyte count was higher in affected camels compared to negative camels. Total protein, serum albumin, globulins, glucose and calcium were significantly lower, while urea values were significantly higher in affected camels. magnesium values did not significantly differ between affected and negative camels. In conclusion, trypanosomiasis leads to changes in the haematological and serum biochemical profiles of camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, possible trypanosomiasis, clinical picture, blood chemistry, blood proteins, blood sugar, calcium, magnesium, nitrogen levels, erythrocyte count, globulins, hematocrit, hematology, hemoglobin, leukocyte count, serum albumin, *Trypanosoma,* Saudi Arabia.

Aly, KH; Ali, MM; Hussien, H. **Anatomical, radiographical and ultrasonographical study of the male urethra of the one humped camel (*Camelus dromedarius*).** *Assiut Veterinary Medical Journal*. 2007; 53(114): 8-19. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: The aim of this work was to study the male dromedary camel urethra grossly, radiographically and ultrasonographically to use them in the diagnosis and treatment of urethral surgical lesions, especially in cases of urolithiasis. Eight male dromedary camel urethra samples and six clinically healthy non-castrated animals were used in this study. The shape

and size of the different parts of the male dromedary urethra as well as the urethral length and width were studied. Ultrasonography was used to get measurements of the urethral lumen along its length. It was shown that the male dromedary urethra is relatively short and the width of the urethral lumen decreases gradually toward the tip of the penis. The sigmoid flexure is gently curved, forming a slight binding. Urethral obstruction rarely occurs in male dromedary camels. The diagnosis of urethral lesions is impossible using plane or contrast radiography and ultrasonographic examination could be successfully used. On the other hand, these results show that the best site for urethrotomy is at the level of the palpable ischial arch approximately 3 cm distal to the anus.
Descriptors: dromedary camels, males, camel anatomy, urethra obstruction, urolithiasis, diagnosis, diagnostic techniques, radiography, ultrasonography, surgical procedure, urethrotomy.

Antoine Moussiaux, N; Faye, B; Vias, GF. **Tuareg ethnoveterinary treatments of camel diseases in Agadez area (Niger)**. *Tropical Animal Health and Production.* 2007 Feb; 39(2): 83-89. ISSN: 0049-4747
DOI : http://dx.doi.org/10.1007/s11250-007-4404-1
NAL call no : SF601.T7
Abstract: For generations, nomadic herders have been learning to manage herd health, particularly in dromedaries because of their great value. Owing to the unavailability of veterinary services, camel herders in remote areas have been developing their own pharmacopoeia and veterinary techniques. The bleeding of sick animals is a common treatment, as Tuareg herders believe that 'tainted blood' (izni) is the cause of many conditions. Several surgical techniques are also used, such as excision of calcified sublingual cord. The remedies mentioned in this survey are derived from *Maerua crassifolia*, *Boscia senegalensis*, *Acacia raddiana*, *Cucumis prophetarum*, *Calotropis procera*, *Ricinus communis*, *Citrullus colocynthis*, green tea, millet, tobacco and onions. Artificial elements are also used for treatment of animals: Powders collected from batteries, various haircare or skincare creams, crushed glass, insecticides or motor oil belong to their pharmacopoeia. This broadmindedness allows the introduction of modern veterinary medicine. Factors such as the lack of real production objectives constitute limits to this progress, however.
Descriptors: camels, herd health, nomadic Tuareg, ethnoveterinary, ethnobotany, ethno remedies, pharmacopoeia, non-organic items, Niger.

Beniwal, BS; Singh, RP. **Haemato-biochemical changes in camels suffering from pica.** *Annals of Agri Bio Research.* 2007; 12(1): 83-86. ISSN: 0971-9660
NAL call no.: S3.A66
Abstract: Haematological and biochemical studies were carried out in 60 camels suffering from pica. Twenty apparently healthy camels served as controls. The haemogram of affected camels revealed significant decrease in hemoglobin, total erythrocyte count, packed cell volume, mean corpuscular volume and mean corpuscular haemoglobin, indicating microcytic hypochromic anaemia. Erythrocyte sedimentation rate and eosinophils were significantly high in affected animals. The total leukocyte count, neutrophils, lymphocytes and monocytes percentage and osmotic fragility of erythrocytes remained unaffected. Affected camels had significantly low levels of serum calcium, inorganic phosphorus, zinc and copper, whereas

sodium, potassium, magnesium, chloride and manganese values were within normal range. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, pica behavior, anemia, red blood cells, erythrocytes, white blood cells, eosinophils, hematology, hemoglobin value; leukocyte counts, lymphocytes, monocytes, neutrophils, blood chemistry, calcium, chloride, copper, magnesium, manganese, phosphorus, potassium, sodium, zinc, anemia.

Bryant, B; Portas, T; Montali, R. **Mammary and pulmonary carcinoma in a dromedary camel (*Camelus dromedarius*).** *Australian Veterinary Journal.* 2007 Jan-Feb; 85(1): 59-61. ISSN: 0005-0423
NAL call no: 41.8 Au72
Descriptors: dromedary camels, females, carcinoma, lung cancer, mammary neoplasms, mammary glands.

Champak Bhakat; Sahani, MS. **Health hazards of camel in irrigated and non-irrigated zones of Thar desert.** *Indian Veterinary Journal.* 2007; 84(12): 1332-1333. ISSN: 0019-6479
URL: http://www.indvetjournal.com
NAL call no.: 41.8 IN2
Abstract: Data were collected from 14 veterinary hospitals in irrigated (seven veterinary hospitals) and non-irrigated (seven veterinary hospitals) zones of Bikaner (Thar) district, India, from March 1998 to March 2003. During the period, 2482 and 2066 camels were examined from irrigated and non-irrigated regions, respectively. Details and comparative observations were recorded on camel health disorders in different years, body system involved, management practices, morbidity and mortality, camel keeping pattern and treatment cost. The incidence of mange was highest in both irrigated (49.11%) and non-irrigated (45.85%) zones. This was followed by ruminal impaction, diarrhoea, other gastrointestinal disorders and trypanosomiasis. The incidence of pneumonia, upper respiratory infection, retention of placenta, other reproductive problems, wound/abscess/saddle gall and miscellaneous health problems varied over the years in irrigated and non-irrigated regions. The other health problems observed were fracture, sprain, injuries, tail gangrene, pica, avitaminosis, agalactia, pyrexia, ecthyma, mastitis and conjunctivitis. Skin infection (mange and fungal infection), trypanosomiasis (caused by Trypanosoma evansi), respiratory system involvements and saddle gall/wound/abscess were more in irrigated belt as compared to non-irrigated areas. The morbidity of trypanosomiasis was higher in the irrigated belt (9.26%) as compared to non-irrigated region (8.37%). Most farmers (78.48% of irrigated zone and 80.68% of non-irrigated zone) preferred traditional treatment. The cost of allopathic treatment ranged from Rs 250 to 500 per camel (injectable drugs) and Rs 90 to 160 (spray application). It is concluded that mange is the major problem of camel of the Thar desert, followed by ruminal impaction and other gastrointestinal disorders. Reproduced with permission of CAB.
Descriptors: dromedary camels, animal diseases, animal health, *Trypanosoma evansi*, costs of disease, disease prevalence, disease surveys, epidemiology, gastrointestinal diseases, mange, trypanosomiasis.

Dedet, JP. **Les decouvertes d'Edmond SERGENT sur la transmission vectorielle des agents de certaines maladies infectieuses humaines et animales. [Edmond Sergent's discoveries on the vectorial transmission of agents of human and animal infectious diseases.]** *Bulletin de la Societe de Pathologie Exotique.* 2007; 100(2): 147-150. ISSN: 0037-9085. Note: In French with an English summary.
URL: http://www.pathexo.fr
Abstract: Edmond Sergent has been head of the Institut Pasteur in Algeria during 1910-63, and during those years, carried out an impressive scientific research and studied a lot of agents responsible for human, animal and plant diseases. In the field of vectorial transmission of infectious diseases, he made two essential discoveries: the transmission of cosmopolitan relapsing fever by human body louse in 1908, a year before Charles Nicolle discovered the transmission of the classical exanthematic typhus by the same insect, and the transmission of cutaneous leishmaniasis by the phlebotomine sandfly. Moreover, he made other discoveries in similar fields, such as the transmission of dromedary trypanosomiasis by Tabanids, and later by *Stomoxys calcitrans*, and the transmission of the pigeon *Haemoproteus* by *Lynchia maura*. Finally, he described the transmission of *Theileria dispar* (now *T. annulata*) by the tick *Hyalomma mauritanicum* (1928). Reproduced with permission of CAB.
Descriptors: Edmond Sergent, Insitut Pasteur, early researcher, animal and human diseases, medical entomologist, veterinary entomology, disease transmission, disease vectors, vector borne diseases, cutaneous leishmaniasis, louse borne typhus, protozoal infections, trypanosomiasis, dromedary camels, pigeons, *Haemoproteus*, *Hyalomma*, *Leishmania,* Phlebotominae, *Pseudolynchia canariensis*, *Rickettsia prowazekii*, *Stomoxys calcitrans,* Tabanidae, *Theileria annulata*, *Trypanosoma*, *Hyalomma mauritanicum*, *Lynchia maura*.

Fouda, TA; Al Mujalii, AM. **Pneumo-enteritis in Arabian camel-calves (*Camelus dromedarius*): clinical and laboratory investigations.** *Journal of Camel Practice and Research.* 2007; 14(2): 119-124. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Seventeen diseased Arabian camel calves (*Camelus dromedarius*), 1-3 months of age in addition to the 5 more apparently healthy calves have been involved in this study. The selected animals were admitted with varying clinical disease conditions, but all had general history of diarrhoea, inappetence and poor body conditions. Based on the results of clinical and laboratory examinations, the diarrhoeic calves were allotted into 2 groups; Group (1) involved calves with bacterial diarrhoea and respiratory manifestations, while group (2) included diarrhoeic calves because of protozoal infestations. Blood samples for complete blood counts and biochemical analysis were obtained from all diseased and healthy calves. In addition, rectal as well as nasal swabs and faecal samples were also obtained from the diseased calves and were subjected to bacteriological and parasitological examinations. The most prominent clinical signs among diseased calves were profuse watery, yellowish diarrhoea with offensive smell, elevated rectal temperatures and respiratory distress, varying degrees of dehydration, poor body conditions and reluctant to suckling their dams. Bacteriological examination revealed that *E. coli* and *Proteus* spp. was the incriminated micro-organism causing diarrhoea and *Staph. aureus* was the causative agent of respiratory troubles in diseased calves of group (1), while parasitic examination indicated that *Eimeria* spp. and *Balantidium coli* were responsible for diarrhoea in calves of group (2). The obtained results of haemogram

revealed significant increase in the mean values of total leucocytic counts and packed cell volume in diseased calves with either bacterial or parasitic diarrhoea if compared with their values in healthy control calves. Differential leucocytic counts showed varying patterns as in the diarrhoeic calves with *E. coli* and *Proteus* infections. There is neutrophilia, while those calves with parasitic diarrhoea had eosinophilia. Biochemical analysis of blood sera samples revealed significant elevation in the mean values of potassium and blood urea nitrogen with significant reduction in the mean values of total proteins, albumin, sodium and chloride in the diarrhoeic calves of both groups if compared with their values in the healthy control group. The diseased calves showed varying response to the treatment protocols with gradual improvement within 2 weeks. Reproduced with permission of CAB.
Descriptors: dromedary camels, etiology, bacterial diseases, protozoal infections *Balantidium coli*, *Eimeria*, *Escherichia coli*, *Proteus*, *Staphylococcus aureus*, clinical aspects, diarrhea, respiratory diseases, intestinal diseases.

Gahlot, TK; Jhirwal, SK; Bishnoi, P; Sakar Palecha; Purohit, S. **Radical mastectomy in dromedary camels: case report.** *Journal of Camel Practice and Research.* 2007; 14(1): 39-40. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camels, mammary gland disease, mastitis, clinical aspects, mastectomy, surgical procedure, post surgical care, case report, India.

Gahlot, TK. **Lameness in camels.** In:TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 166-167.
Abstract: The lameness in 256 camels was diagnosed in a period of 2 years, i.e. 2003-2005. The basis of diagnosis of lameness was precise history, clinical signs and diagnostic tools. The animals were observed in standing position from front, sides and rear positions. The supportive, swinging or complementary type of lameness was also observed. Camels were viewed during progression in a straight line, in a circle (clock and anticlock wise) and by observing gait on sandy, pebbled or hard tracks. Camels were viewed from the side and rear positions while sitting. Anterioposterior (AP), posterioanterior (PA) or lateral radiographic views were taken. Bovine hoof tester was used to detect the point of entry of foreign body in punctured foot cases. The lameness was diagnosed in 256 camels out of which 116 were diagnosed in forelimb and 140 were diagnosed in hind limbs. In forelimb the highest incidence of affection was punctured foot (43.1%) followed by myositis and spasm of pectoral muscles (21.55%), fracture of metacarpus (6.03%), fracture of humerus and phalanges (3.44%, each) and fistulous tracts at scapular region and fractured carpal bones (2.5%, each). In hind limb, the surgical affections found highest were hock joint arthritis (32.14%), followed by punctured foot (17.85%), upward fixation of patella (10.71%), fracture of tarsal bone (5.71%), fracture of metatarsus, thoroughpin and fracture of phalanges (3.57%, each), spinal concussion, kumri, arthritis of fetlock (2.85%, each), hip joint dislocation, fracture of tibia and popliteal lymph node abscess (2.14%, each). In animals of present study the incidence of lameness was found more in hind leg. The fracture of long bones was primarily due to external trauma, caused by automobile accident, or falling of camel with a loaded cart. The phalangeal fractures occurred due to catching of foot in a ditch or depression where as carpal

or tarsal fracture occurred due to sudden turning or twisting of the leg. Reproduced with permission of CAB.
Descriptors: dromedary camels, abscesses, arthritis, bone fractures, clinical aspects, diagnosis, dislocations, lameness, limb bones, myositis, spasms, trauma, clinical picture, India.

Gahlot, TK; Dudi, PR; Sharma, CK; Bishnoi, P; Purohit, S. **Surgeries of head and neck region of dromedary camel in India.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference-"Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 171-175.
Abstract: Camels brought for the treatment of injuries to mandible, soft palate, lips, nostrils, parotid duct, eyeball, eyelids, ear, etc form part of this study of head and neck region during last five years (2001-2006) in the surgery clinics. Surgical affections recorded were mandibular fractures, abscess and gangrene of soft palate, laceration at commissure and nostrils, salivary and buccal fistula, lacerations of eyelids and cornea, rupture of eyeball and otitis externa. Majority of surgeries were performed by securing the camel in sternal recumbency under xylazine sedation and local infiltration of anaesthesia or nerve block. Surgical procedures used were interdental wiring, reinforced brass rod interdental wiring, resection of soft palate, commissurorrhaphy, ligation of Stenson's duct and repair of buccal fistula, blepharoplasty, enucleation, corneal suturing, tarsorrhaphy and Zepp's operation. Majority of these treatments were developed in the clinic and were successfully performed on clinical cases. The etiology, clinical signs and postoperative care are also discussed. Reproduced with permission of CAB.
Descriptors: dromedary camels, abscesses, etiology, animal diseases, bone fractures, clinical aspects, diagnosis, head, neck, necrosis, post-operative care, surgery, surgical operations, trauma, India.

Gahlot, TK; Sakar Palecha; Shriram Soni. **Cleft palate in a camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research*. 2007; 14(2): 169-170. ISSN: 0971-6777
URL : http://www.camelsandcamelids.com
Abstract: A 3-year-old male dromedary camel from Rajasthan, India, was presented with a history of the appearance of small amounts of regurgitate food through the nostrils during mastication and regurgitation [date not given]. No other abnormalities were observed and the animal was apparently healthy and within normal physiological limits. Oral examination revealed a 7-cm long opening located dorsally in the oro-pharyngeal region and caudal to the hard palate, leading to the diagnosis of a cleft palate. The owner was advised to have the camel treated surgically but did not return for the procedure. Republished with permission of CAB.
Descriptors: dromedary camel, cleft palate, clinical aspects, diagnosis, case reports, India.

Gahlot, TK; Sakar Palecha; Shriram-Soni; Ayub, M. **Surgical removal of an embedded wooden peg from scapular region in camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research.* 2007; 14(2): 207-208. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: The successful surgical removal of a wooden foreign body causing a penetrating wound in the prescapular region in the left foreleg of a 7-year-old male dromedary camel in

Rajasthan, India, is presented.
Descriptors: dromedary camels, foreign body wound, foreign body, wooden peg penetration of pre-scapular location, foreign body removal, surgical procedure, case study, clinical aspects, therapy, trauma wounds, India.

Mohammed , AK ; Sackey, AKB; Tekdek, LB; Gefu, JO. **Serum biochemical values of healthy adult one humped camel (*Camelus dromedarius*) introduced into a sub-humid climate in Shika - Zaria, Nigeria.** *Journal of Camel Practice and Research.* 2007; 14(2): 191-194. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Eleven adult dromedaries introduced into a sub-humid climate were bled monthly for 36 months to establish mean serum biochemical reference values for the zone. Mean sodium concentration was 144.57+or-1.31 mmol/l, potassium 5.03+or-0.42 mmol/l and chloride 104.06+or-2.05 mmol/l. Others were bicarbonate 23.57+or-1.04 mmol/l, calcium 2.39+or-0.05 mmol/l and phosphate 1.07+or-0.04 mmol/l. The urea value was 4.92+or-0.55 mmol/l and that of creatinine was 85.70+or-8.85, while glucose had 2.62+or-0.18 mmol/l, total protein 64.94+or-1.55 g/l and albumin 33.98+or-0.98 g/l. The male camels had significantly ($P<0.05$) higher potassium and creatinine levels while urea, total protein and albumin values were higher ($P<0.05$) in the she-camels. Wet season samples had higher ($P<0.05$) blood urea nitrogen, creatinine and glucose values while potassium was insignificantly ($P>0.05$) higher in the dry season samples. Reproduced with permission of CAB.
Descriptors: dromedary camels, bicarbonates, blood chemistry, blood protein, plasma protein, blood serum, blood sugar, calcium, chloride, creatinine, heat stress, phosphate, potassium, seasonal variation, serum albumin, sodium, urea, seasonal fluctuation.

Probst, C; Speck, S; Hofer, H. **Epidemiology of selected infectious diseases in zoo-ungulates: single species versus mixed species exhibits.** In:G Wibbelt; N Bergholz; S Seet; H Hofer (Editors) *Proceedings of the Institute for Zoo and Wildlife Research, Berlin.* 2007; (7): 10-12. ISSN: 1431-7338. Note: Erkrankungen der Zootiere. Verhandlungsbericht des 43. Internationalen Symposiums uber die Erkrankungen der Zoo und Wildtiere, Edinburgh, UK, 19-20 May, 2007.
URL: http://www.izw-berlin.de
Abstract : A total of 926 ungulates of the three families of Bovids, Cervids, and Camelids from one Czech and ten German zoos were tested for antibodies against selected infectious agents that can be transmitted interspecifically. The relationship between taxonomy and exhibit type (single species/mixed species exhibit) and seroprevalence was examined. The highest seroprevalence (21.2%) was found against malignant catarrhal fever (MCFV). Especially Bovids (24.5%) and animals of petting zoos (60.6%) were seropositive. Reproduced with permission of CAB
Descriptors: bovines, dromedary camels, cervids, ungulates, zoo animals, disease prevalence, disease surveys, disease transmission, ELISA, antibodies, epidemiology, malignant catarrhal fever, serology, seroprevalence, virus neutralization, bovine diarrhea virus, bovine herpesviruses, caprine herpesvirus 1, *Coxiella burnetii*, *Mycobacterium avium* subsp *paratuberculosis,* catarrhal fever, gangrenous coryza, malignant catarrh, mucosal disease virus, Germany.

Ramadan, RO; Al Mubarak, AI. **Fractures of the proximal part of the radius and ulna in camels (*Camelus dromedarius*).** In:TK Gahlot(Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 176-177.
Abstract: Fractures of the proximal part of the radius and ulna were caused by traumatic injury or the result of unusual twist during mating. The fractures were predominantly noted in the female. The right and left radius and ulna were involved at all age group and the fractures were mostly simple. Radiographic examination revealed that the fractures were either oblique or comminuted. The proximal part of the ulna might be fractured at various points particularly at the level of the humero-radial joint. Conservative treatment resulted in malunion and or degenerative joint disease. Internal fixation with plate and screws gave good result in the young animals. Reproduced with permission of CAB.
Descriptors: dromedary camels, bone fractures, clinical aspects, diagnosis, fracture fixation, joint diseases, radiography, radius, surgery, trauma, ulna, arthropathy, clinical picture, traumas.

Ramadan, RO. **Radius curvus in camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 168-170.
Abstract: Radius curvus was considered as an idiopathic defect of the radius and ulna resulting in bowing of the shaft of the bone. The medial surface of the radius was convex while its lateral part was concave. The affected limb appeared shorter than normal. It was noted in the right or the left limb, 2 to 5 weeks after parturition. The angulations might reach 40 degree. Animals suffered an incapacitating lameness. The condition was studied radiographically and its treatment was by a wedge osteotomy. The limb was later supported in fibreglass casting resin. The result was favourable. Reproduced with permission of CAB.
Descriptors: dromedary camels, abnormalities, bone diseases, case reports, clinical aspects, diagnosis, lameness, radius, surgery, ulna, Saudi Arabia.

Reece, J. **Fixing fractured camel jaws.** *Veterinary Times.* 2007; 37(17): 14-15. ISSN: 1352-9374
Descriptors: dromedary camels, bone fractures, case reports, fracture fixation, mandible fracture, surgical repair, surgical techniques, postoperative care.

Saini, N; Singh, N; Singh, GP; Kiradoo, BD; Bhardwaj, A. **A technique of indwelling cannulation of compartment one (C<ovid:sub>1</ovid:sub>) by trocharisation of a dromedary camel. Journal of Camel Practice and Research.** 2007; 14(1): 41. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camels, cannulation, rumen fluid, techniques.

Siddiquee, GM; Bhatol, JG. **Retention of placenta in a Kutchchhi camel: a case report.** *Indian Journal of Field Veterinarians.* 2007; 3(1): 54-55. ISSN: 0973-3175
URL : http://www.ivri.nic.in
Descriptors: dromedary camels, Kutchchhi breed, adult female, placental retention, diagnosis, treatment, case report, Gujarat, India.

Tuteja, FC; Dixit, SK. **Studies on treatment and control of intramammary infections in camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 27-30.

Abstract: Systemic administration of antibiotics and feeding of minerals for the treatment and control of intramammary infections was studied. In the treatment of apparently healthy but culturally positive quarters, combination of amoxycillin and cloxacillin resulted in 69.23% clearance of infections and its efficacy was improved to 84.61% when given along with vitamin-E and selenium. Whereas, the overall efficacy of treatment with ascorbic acid alone was 46.1%. In the treatment of culturally positive and apparently clinical quarters, enrofloxacin resulted in 77.77% clearance of infections. The lower infection rate in milking animals as compared to drying off animals shows flushing action of milking. Daily feeding of Cu, Zn and Se for 30 days resulted in almost 40% reduction of infections.

Descriptors: dromedary camels, amoxicillin, antibiotics, ascorbic acid, cloxacillin, disease control, drug combinations, drug therapy, enrofloxacin, feed supplements, mammary gland diseases, mastitis, minerals, multiple drug therapy, nutritional support, potency, selenium, trace elements, vitamin E, zinc, copper, *Corynebacterium,Micrococcus* bacteria, *Staphylococcus*, *Streptococcus*, amoxicillin, cloxicillin, chemotherapy, combination drug therapy, microelements, vitamin C.

Tuttle, AD; Frederico, L; Linder, K; Gunkel, C; Remick, A; Redding, R. **Pathological fracture of the ulna due to osteosarcoma in an Arabian camel (*Camelus dromedarius*).** *Veterinary Record*-London. 2007 July 7; 161(1): 30-33. ISSN: 0042-4900

URL : http://veterinaryrecord.bvapublications.com/

NAL call no: 41.8 V641

Descriptors: dromedary camels, osteosarcoma, ulna, bone fractures, case study.

Wernery, U; Kinne, J. **An approach to the diagnosis of camel diseases: clinical pathology and post-mortem criteria.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 19-22.

Abstract: The most important camel diseases are systematically presented. The presentation starts with skin diseases, including camelpox, orf, dermatophilosis, pseudotuberculosis, mange and others, followed by internal diseases. They include systemic diseases like anthrax, endotoxicosis and organ diseases like tuberculosis, paratuberculosis, melioidosis, tetanus, rickettsiosis, colibacillosis, FMD, mycotic diseases and some diseases caused by deficiencies or toxins. The diseases are explained with the help of pictures, including histological explanations from diseased camels or their altered organs. Special effort has been made to include a differential diagnosis for each disease. Reproduced with permission of CAB.

Descriptors: camels, important camel diseases, etiology, animal pathology, camelpox, orf, dermatophilosis, pseudotuberculosis, anthrax, endotoxicosis, tuberculosis, paratuberculosis, melioidosis, tetanus, rickettsiosis, colibacillosis, FMD, mycotic diseases, mange, deficiencies, toxins, clinical aspects, diagnosis, differential diagnosis, histopathology, photographic illustration of diseases, postmortem examinations, post mortem sampling, clinical picture.

Wernery, U; Thomas, R; Syriac, G; Raghavan, R; Kletzka, S. **Seroepidemiological studies for the detection of antibodies against nine infectious diseases in dairy dromedaries (Part - I).** *Journal of Camel Practice and Research*. 2007; 14(2): 85-90. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A total of 1119 dromedary sera (from 541 dams and 578 calves) in Dubai were tested for 9 different infectious diseases using commercially available ELISAs or other tests [date not given]. No antibodies were detected against foot and mouth disease (FMD), rinderpest (RP) and Peste des petits ruminants virus (PPR), but antibodies were found for West Nile Fever (WNF), tuberculosis (Tb), brucellosis, anaplasmosis (AP), trypanosomiasis (Tryp) and toxoplasmosis (TG). Reproduced with permission of CAB.
Descriptors: dromedary camels, *Anaplasma*, Foot and mouth disease virus, *Mycobacterium bovis*, Peste des petits ruminants virus, Rinderpest virus, *Toxoplasma*, *Trypanosoma*, West Nile virus, agglutination tests, animal diseases, antibodies, antibody testing, antibody detection, diagnosis, diagnostic techniques, disease prevalence, disease surveys, ELISA, epidemiological surveys, epidemiology, immunodiagnosis, infectious diseases, serological surveys, seroprevalence, Dubai.

Zaitoun, AMA. **Contagious skin necrosis of dromedary camels in south Egypt.** *Journal of Camel Practice and Research.* 2007; 14(2): 125-132. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Skin diseases of dromedary camels in different localities of south Egypt were surveyed during July 2002-December 2005. Forty-one (1.83%) of the examined camels (n=2237) showed signs of contagious skin necrosis (CSN). Prevalence of CSN was found increased as the age of animal increased until 5.5 years and thereafter decreased gradually with increasing age. CSN was independent of sex ($P<0.05$) and was more prevalent in the hot months ($P<0.01$). Skin diseases were more prevalent ($P<0.01$) in irrigated areas than desert lands of south Egypt. However, there was no significant variation in susceptibility of camels located in irrigated and desert areas to CSN. Staphylococcus aureus was the predominant isolated bacteria. Haemoprotozoal examinations indicated that 60.98% of the diseased camels with CSN were harbouring *Trypanosoma evansi* in their blood. The role of this parasite is discussed. Faecal analyses were insignificant.
Descriptors: dromedary camels, skin diseases, *Staphylococcus aureus*, *Trypanosoma evansi*, etiology, age differences, disease prevalence, disease surveys, epidemiological surveys, epidemiology, geographical variation, necrosis, seasonal variation, Egypt.

Zakia Mohammed, A; Ramadan, RO; Al Mubarak, AL. **Rhabdomyosarcoma in a she-camel (*Camelus dromedarius*).** *Journal of Camel Practice and Research*. 2007; 14(2): 165-167. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A 9-year-old female camel was presented to the Veterinary Teaching Hospital, King Faisal University, Saudi Arabia, [date not given] with a rounded hard nodular growth occluding the right nostril. The growth was removed surgically and did not recur 6 months after excision. Histopathologically, the tumour revealed variable sized round cells, spindle, polygonal including racquet-shaped, strap like and multinucleated cells. Muscle striations were scarcely observed and mitotic figures were frequently seen. These cells were strongly positive

for desmin. According to the histopathological and immunohistochemical findings the case was diagnosed as a relatively poorly differentiated pleomorphic rhabdomyosarcoma.
Descriptors: female dromedary camel, case report, cancers, clinical picture, myopathy clinical aspects, diagnosis, histopathology, muscular neoplasms, sarcoma, surgery.

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Agab, H. **Diseases and causes of mortality in a camel (*Camelus dromedarius*) dairy farm in Saudi Arabia.** *Journal of Camel Practice and Research.* 2006; 13(2): 165-169. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The diseases and causes of mortality in intensively kept dromedary camels reported in this study were studied throughout one year (July 2001-June 2002) in a dairy camel farm in Al-Qassim region, central Saudi Arabia. The camel population in the farm at the study period was composed of 2316 adult and weaned calves and 126 suckling calves. 942 camels were affected with one or more disease conditions, giving a crude morbidity rate of 38.6%. The ten most common diseases encountered among the camels of the farm were mange (22.6%), mastitis (20.9%), camel dermatophilosis (18.7%), Heyam syndrome (trypanosomiasis like sings) (14.5%), skin wounds and abscesses (4.2%), calf diarrhoea (4.1%), diazinon toxicity (3.5%), snake bites (1.9%), respiratory complaints (1.8%) and papillomavirus infection (1.7%). Other diseases encountered included eye affections (1.2%), metritis (1%), uterine prolapse (1%), retained placenta (0.7%), bone fractures (0.6%), urea intoxication (0.5%), abortions (0.5%) and dystocia (0.4%). During the period of study, 180 camels died, giving a crude mortality rate of 7.4%. The most common causes of mortality recorded in the camel farm were due to Heyam syndrome (53.3%), diazinon toxicity (15%), snake bites (10%), calf diarrhoea (8.9%), undiagnosed cases (5%), bone fractures (3.3%), urea intoxication (2.8%), uterine prolapse (1.1%) and dystocia (0.6%).
Descriptors: dromedary camels, abortion, camel diseases, *Dermatophilus*, papillomavirus, *Trypanosoma,* disease prevalence, disease surveys, epidemiological surveys, epidemiology, abscesses, etiology, bone fractures; causes of death; diarrhea, dystocia, endometritis, uterine prolapse, placental retention, eye diseases, mastitis, respiratory diseases, skin diseases, snake bites, milk production, morbidity, mortality, poisoning, diazinon, toxicity, wounds, Saudi Arabia.

Al Sadi, HI; Al Obidi, AA. **Sebaceous carcinoma of the eyelid in a camel (*Camelus dromedarius*): case report.** *Iraqi Journal of Veterinary Sciences.* 2006; 20(1): 87-89. ISSN: 1607-3894. Note: English with an Arabic summary.
Abstract: A case of spontaneous sebaceous carcinoma of the eyelid in an adult male one-humped camel was described. No report was made of this type of tumour in camels. Grossly, the tumour was yellowish white, ulcerated and alopecic. Microscopically, the tumour consisted of multiple lobules of cells that showed a variable degree of lipidization, considerable nuclear and cellular pleomorphism, nuclear hyperchromasia, considerable mitotic figures, and necrosis.
Descriptors: dromedary camels, sebaceous carcinoma, case reports, eyelid diseases, eyelids, histopathology, neoplasms, skin glands, cancers, Iraq.

Ali, M Al Haj; Nyberg, Fred; Chandranath, SI; Ponery, AS; Adem, A; Adeghate, E. **Effect of high-calorie diet on the prevalence of diabetes mellitus in the one-humped camel (*Camelus dromedarius*).** In: E. Adeghate; H. Saadi; A. Adem; E. Obineche (Editors). *International Conference on Recent Advances in Diabetes Mellitus and Its Complications, Al Ain, U Arab Emirates; March 06 -09, 2006.* Published by Blackwell Publishing, Oxford. 2006. ISSN: 0077-8923 (print). ISBN: 9781573316354

Descriptors: dromedary camels, diabetes mellitus, prevalence, high calorie feed group, normal feed group, plasma insulin levels went down in high calorie feed group, liver enzymes normal, liver enzymes normal, iron and copper elevated in high calorie group, increased calories appear associated with disorders in glucose metabolism.

Ali , MA; Nyberg, F; Chandranath, SI; Ponery, AS; Adem, A; Adeghate, E. **Effect of high-calorie diet on the prevalence of diabetes mellitus in the one-humped camel (*Camelus dromedarius*).** *Annals of the New York Academy of Sciences.* 2006; 1084: 402-410. ISSN: 0077-8923. Note: E Adeghate; H Saadi; A Adem; E Obineche (Editors). "International Conference on Recent Advances in Diabetes Mellitus and Its Complications, Al Ain, United Arab Emirates, 6-9 March 2006."

DOI: http://dx.doi.org/10.1196/annals.1372.034

Abstract: The one-humped camel is a typical desert animal. It has the capability of withstanding the harsh climatic changes and the scarcity of food and water, in addition to the high-ambient temperature. The prevalence of diabetes mellitus in two different groups of the one-humped camel, group (A) control (n=102) camels and group (B) high-calorie diet-fed camels (n=103), in Al-Ain region (UAE) was studied using biochemical and radioimmunoassay techniques. In this article, 7% of the control camels have diabetes mellitus (blood glucose level: >=140 mg/dL) compared to 21% of the high-calorie-fed camels. Plasma insulin level was significantly (P<0.05) lower in group B compared to group A. The low insulin level in camels consuming high-caloric diet could be a sign of exhaustion of pancreatic beta cells. The hematological parameters were nearly similar in both groups and no significant differences were seen. Liver and kidney enzymes were normal in both groups. Iron and copper were significantly (P<0.005) higher in the high-calorie-fed camels compared with the control. Our study indicates that high-caloric feed consumption in camels is associated with the development of disorders in glucose metabolism leading to diabetes mellitus. Reproduced with permission of Cab.

Descriptors: dromedary camels, blood plasma, dates, diabetes mellitus, diets, ghee, honey, insulin, iron, copper, milk, UAE.

Anonymous; Hodl,Thomas [Inventor]. **Training and therapy device for dogs and hoofed animals.** *Official Gazette of the United States Patent and Trademark Office Patents.* 2006. ISSN: 0098-1133

Abstract: The invention concerns an orthopedic training or therapeutic device for dogs, hoofed animals, and camels that consists of at least one elastic band (3), at least over part (5) of its length, and that is fastened on one side to the middle rear paw or middle front paw of the extremity (4) being treated and cooperates on the other side with a chest harness (2) of the animal (1). The invention is characterized by the fact that the band (3) is fastened on the other side to a linkage point (7, 7 ') in the upper area of the chest harness (2) on the withers

or on the side.
Descriptors: dogs, hoofed animals, camels, orthopedic training device, restraining device, field equipment, harness and bands.

Atif, EAG; Hildebrandt, G; Kleer, JN; Molla, B; Kyule, MN; Baumann, MPO. **Comparison of California Mastitis Test (CMT), Somatic Cell Counts (SCC) and bacteriological examinations for detection of camel (*Camelus dromedarius*) mastitis in Ethiopia.** *Berliner und Munchener Tierarztliche Wochenschrift.* 2006; 119(1/2): 45-49. ISSN: 0005-9366. Note: In English with a German summary.
Abstract: The objective of this study was to compare the results of California Mastitis Test (CMT), Somatic Cell Count (SCC) and bacteriological examinations for the detection of udder infections in camels. A total of 956 quarter milk samples from 253 traditionally managed lactating camels were collected aseptically from Negele (Borena Region), Dire Dawa, and Gewane (Afar Region), Ethiopia according to multi-stage sampling. The quarter milk samples were subjected to CMT, SCC and bacteriological examinations. 571 (59.7%) quarter milk samples had microorganisms. Out of the 571 samples, 428 (75.0%) had isolates that were identified as major pathogens (MAP) and 143 (25.0%) as minor pathogens (MIP). A positive correlation was found between CMT scores and bacteriological classes (MAP, MIP) (p-value=0.00). A high correlation (p-value=0.00) was obtained between CMT scores and SCC. The differences among the median log SCC of bacteriological classes (MAP, MIP) were not significant (p-value=0.24). Similarly, the application of the cut-off level of 2.5x105/ml indicated less agreement (p-value=0.32) for bacteriological classes MAP and MIP. It is concluded that CMT can be used for the detection of udder infection in camels, while further investigation is required for the use of SCC as a diagnostic tool for normal and mastitic camel milk.
Descriptors: dromedary camels, camel milk, bacteriology, mastitis, California Mastitis Test, diagnosis, diagnostic techniques, somatic cell count, udder quarters, Abyssinia, Ethiopia.

Bani Ismail, Z; Al Rukibat, R. **Synovial fluid cell counts and total protein concentration in clinically normal fetlock joints of young dromedarian camels.** *Journal of Veterinary Medicine—Zentralblatt fur Veterinarmedizin Reihe-A.* 2006 June; 53(5): 263-265. ISSN: 0931-184X
DOI: http://dx.doi.org/10.1111/j.1439-0442.2006.00823.x
NAL call no: 41.8 Z5
Abstract: Twenty-seven 9-12 months old healthy male dromedarian camels were used to determine total nucleated leucocyte count (TNCC), absolute and percentages of polymorphonuclear (PMN) and mononuclear leucocytes, and total protein (TP) concentration in synovial fluid from grossly and radiographically normal fetlock joints. Arthrocentesis was performed bilaterally from the fetlock joints of the forelimbs and hindlimbs. Blood contaminated samples and samples obtained from grossly or radiographically abnormal joints were excluded. The mean +/- SD of TNCC in 108 samples of fetlock joint synovial fluids was 500 +/- 400 cells/(So(Bl. Monocytes/macrophages were the predominant cell type. There were no significant differences in mean TNCC, absolute numbers and percentages of various leucocytes and TP concentrations between the right and left fetlock joints of the forelimbs and hindlimbs or between the fetlock joints of the forelimbs and hindlimbs. The mean +/- SD of

absolute numbers and percentages of various cell types were: PMN leucocytes 1 +/- 2 cells/(So(Bl (2%), lymphocytes 116 +/- 167 cells/(So(Bl (26%), and monocytes/macrophages 383 +/- 323 cells/(So(Bl (72%). The mean +/- SD of TP concentration was 2 +/- 1 g/dl.
Descriptors: camels, males, young animals, animal diseases, joint diseases, disease detection, disease diagnosis, joints (animal), synovial fluid, forelimbs, normal values, blood cell counts, leukocyte count, radiography, blood chemistry, macrophages, monocytes, fetlock joint.

Bhardwaj, B; Sharma, GD; Surendra Singh; Dadhich, R. **Occurrence and pathology of pneumonia in camels.** *Indian Journal of Veterinary Pathology.* 2006; 30(1): 39-41. ISSN: 0250-4758
URL: http://www.indianjournals.com/ijor.aspx?target=ijor:ijvp&type=home
Abstract: In the present study, 157 samples of camel lungs were collected from carcasses of camels of either sex [place and date not given]. Out of these, four samples had fibrinous pneumonia and 32 had interstitial pneumonia. Grossly, consolidated dark red to reddish black or black areas were seen. Microscopically, the alveolar lumen was filled with fibrinocellular exudates with strands of fibrin passing from alveolus to alveolus through pores of Kohn. Fibrin was less copious as compared to its cellular or serous component. Organization of exudates from the alveolar septa, peribronchial and perivascular area was observed leading to cornification in a few cases. There was drift of alveolar exudates into bronchioles in the form of tubes lined with intact epithelium. Microscopic lesions in acute phase of interstitial pneumonia were characterized by congested alveolar vessels with or without serious exudates in the alveolar lumen and hyaline membrane lining air spaces. Foetalization of lungs was seen in most of the cases. Perivascular and peribronchiolar lymphocytic infiltration and lymphoid hyperplastic changes were found in many cases leading to partial or complete obliteration of the bronchiolar lumen in some cases. In viral type of interstitial pneumonia, characteristic thickening of alveolar walls due to infiltration of macrophages and lymphocytes was found. Cases showing alveolar lumina with large number of giant cells of varied form and size were designated as giant cell pneumonia. In chronic interstitial pneumonia, proliferation of peribronchial and perivascular connective tissue along with mononuclear leukocytic infiltration was found.
Descriptors: dromedary camels, animal pathology, histopathology, lesions, lungs, pneumonia, post slaughter sampling.

Cebra, C. **Advanced diagnostic testing.** *Large Animal Proceedings of the North American Veterinary Conference, Volume 20, Orlando, Florida, USA, 7-11 January, 2006.* 2006; 275-276
URL: http://www.tnavc.org
Descriptors: dromedary camels, alpacas, body fluids, clinical aspects, diagnosis, diagnostic techniques, laparoscopy, radiography, rectal palpation, restraint of animals, ultrasonography, ultrasound, clinical-picture; fecal lysis.

Cebra, C. **Practical fluid therapy.** *Large Animal Proceedings of the North American Veterinary Conference, Volume 20, Orlando, Florida, USA, 7-11 January, 2006.* 2006; 273-274.
URL: http://www.tnavc.org
Descriptors: dromedary camels, alpacas, dehydration, fluid therapy, oral rehydration solutions, drug delivery.

Carbonell, D; Oros, J; Gutierrez, C. **Vertebral osteoma in a dromedary camel.** *Zentralblatt fur Veterinarmedizin—Journal of Veterinary Medicine Series- A Physiology Pathology Clinical Medicine Reihe A.* 2006 Sept; 53(7): 355-356. ISSN: 0514-7158
DOI: http://dx.doi.org/10.1111/j.1439-0442.2006.00857.x
NAL call no: 41.8 Z5
Abstract: A case of vertebral osteoma observed in a female 4-year-old dromedary camel is presented. The patient showed a progressive ataxia, incoordination and finally a permanent recumbence position. Treatment was unfruitful and the animal was humanely euthanized. Postmortem examination revealed an expansive growth at vertebral body of the 10th thoracic vertebra, which was histologically classified as an osteoma. To the author's knowledge, this would be the first description of an osteoma in a camelid species.
Descriptors: dromedary camel, females, animal diseases, neoplasms, bone diseases, thoracic-spine, vertebrae, case study, signs and symptoms-(animals-and-humans), spinal cord, veterbral ostema, movement disorders, disease detection and diagnosis, histopathology, disease course, dexamethasone.

Davis, WC; Hamilton, MJ. **Use of flow cytometry to characterize immunodeficiency syndromes in camelids.** *Small Ruminant Research.* 2006; 61(2/3): 187-193. ISSN: 0921-4488
NAL call no: SF380.I52
Abstract: Disorders in immune function in lamas have been observed over the past years. However, it has been difficult to determine how many types of deficiencies exist. Through the use of flow cytometry and monoclonal antibodies specific for leukocyte differentiation molecules, it has been possible to characterize the immune system of lamas and determine the genetic basis of one disease, the juvenile lama immunodeficiency syndrome (JLIDS). The availability of monoclonal antibodies and flow cytometry now afford an opportunity to clinically diagnose animals with JLIDS at birth and characterize other immunodeficiencies in animals presenting with similar clinical signs of immune dysfunction. The findings also show that flow cytometry can be used to characterize disorders in other species. Reproduced with permission of CAB.
Descriptors: dromedary camels, alpacas, llamas, B lymphocytes, flow cytometry, IgG, immunological deficiency, monoclonal antibodies, immune deficiency, immunodeficiency, leucocytes, leukocytes, white blood cells.

Fahmy, LS; Zabady, MK; Hegazy, AA; Farag, KA. **Angular fetlock deformity of the hind limbs in camels: clinical, radiological and histopathological studies.** *Scientific Journal of King Faisal University Basic and Applied Sciences.* 2006; 7(1): 117-129. ISSN: 1658-0311. Note: In English with an Arabic summary.
Abstract: 25 of 6929 camels of different ages (2-7 years), sexes and breeds were diagnosed as having angular fetlock deformity of the hind limbs. Clinically, those camels were suffering from different degrees of valgus or varus deformities. The predominant radiographic alterations were asymmetric division of the distal end of the third and fourth metatarsals accompanied with shortening. The angle of divergence at the distal end of the metatarsals were measured and classified into 3 grades. Grade I, 22 degrees -27 degrees , grade II, 27.5 degrees -32.5 degrees , grade III, 33 degrees - or more. Necropsy and histopathological findings revealed variable degrees of secondary degenerative joint disease.

Descriptors: dromedary camels, age groups, fetlock, deformities, radiology diagnosis, histopathology, camel leg joint malformation, radiography, sex differences.

Gahlot, TK; Rathore, VS; Soni, RC; Parasher, MC; Qazi, I. **Surgical removal of a harrow and other foreign bodies from compartment one (C<ovid:sub>1</ovid:sub>) and two (C<ovid:sub>2</ovid:sub>) of a dromedary camel - a case report.** *Journal of Camel Practice and Research.* 2006; 13(1): 73-74. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Descriptors: dromedary camels, case reports, foreign body ingestion, cast iron, clinical aspects, pica, surgery, surgical operation to remove foreign objects, India.

Ghulam Muhammad; Abdul Jabbar; Zafar Iqbal; Muhammad Athar; Muhammad Saqib. **A preliminary passive surveillance of clinical diseases of cart pulling camels in Faisalabad metropolis (Pakistan).** *Preventive Veterinary Medicine.* 2006; 76(3/4): 273-279. ISSN: 0167-5877
Abstract: We identified clinical disorders of all 200 city-dwelling cart pulling male camels attending the Veterinary Teaching Hospital, University of Agriculture, Faisalabad, Pakistan during a 7-year period (1993-1999). Data were collected prospectively on a predesigned form and collated. Diagnoses of different diseases/disorders were based on clinical examination supplemented with relevant laboratory tests. A total of 463 entries of 34 different clinical diseases/disorders were recorded. Sarcoptic mange (35% of 200 camels) followed by anhidrosis (23%) and trypanosomosis (19%) were the three most frequently encountered disorders. The body system most often involved was the integument (31%) followed by gastrointestinal (21%), locomotory (12%), thermoregulatory (6%), blood (6%), urogenital (6%), lymphatic (3%), nervous (3%), respiratory (3%) and ocular (3%). Reproduced with permission of CAB.
Descriptors: dromedary camels, draft camels, camel diseases, mange, trypanosomiasis, disease prevalence, disease surveys, epidemiology, *Sarcoptes*, Pakistan.

Hunter, A (Editor). ***La Sante Animale. Volume 2. Principales Maladies. [Animal Health. Volume 2. Principal Diseases.]*** Published by Editions Quae, Versailles. 2006; 310 pp. ISBN: 2759200051; 9782759200054. Note: In French.
Abstract: The first volume of this work considered the fundamentals of animal pathology and the principles of disease control; volume 2 considers the most important diseases of livestock in the tropics and subtropics in more detail. Each disease is described with reference to its symptoms, aetiology, mode of transmission, treatment and prevention. The first part covers infectious and contagious diseases (viral and bacterial diseases, coccidiosis and dermatomycoses) of livestock in general, bovines, small ruminants, camels, equines and pigs. Part 2 covers venereal and congenital infections; part 3 describes arthropod parasites (flies, lice, fleas, ticks and mange mites). Vector-borne diseases of livestock in general, small ruminants and equines are considered in part 4, helminths and helminthoses in part 5, and environmental and other diseases (metabolic disorders, neoplasms, nutritional deficiency and poisoning) in part 6. This book is intended for use by veterinary technicians and agricultural advisors, and as a textbook in higher education. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, horses, pigs, sheep, pigs, livestock animal

diseases, bacterial diseases, clinical aspects, coccidiosis, deficiency diseases, animal disease transmission, drug therapy, ectoparasites, helminthes, infectious diseases, metabolic disorders, poisoning, prophylaxis, tropics, vector borne diseases, viral diseases, bacterial infections, bacterioses, chemotherapy, clinical picture, communicable diseases, parasitic worms, toxicosis, tropical countries, viral infections.

Jensen, JM. **Camelid drug formulary.** Published by Game Ranch Health , San Antonio, TX. 2006; (1st Ed.): 405 pp. ISBN: 9781424312177

Abstract: The book is divided into two main sections, the first dealing with South American Camelids (SAC), llama (*Lama glama*), alpaca (*Lama pacos*), guanaco (*Lama guanicoe*), and vicuna (*Vicugna vicugna*), and the second with dromedaries (*Camelus dromedaries*) and Bactrian camels (*C. bactrianus*). The drugs are grouped in the book according to clinical application (for example, Analgesia, Anaesthesia, Gastrointestinal, Immunization, Reproductive, Vitamins-Minerals). The information consists of a table with five columns entitled Drug, Species, Dosage, Comments, and Reference. For example the information for penicillin in the Reproduction - SAC section is: Drug: penicillin, Species: SAC, Dosage: 22,000 mg/kg, SC, q24h for 3 treatments, Comments: prevention of uterine infection, References: Johnson, L. 1989 [the full references are listed at the end of each of the SAC and Camel sections]. This book will be extremely useful to all veterinarinarians who come across camelids in their work. Reproduced with permission of CAB.

Descriptors: camelids, dromedary camels, Bactrian camels, llamas, alpacas, guanacos, vicunas, antibiotics, anti-infective agents, anti-inflammatory agents, anti-parasitic agents, medicines, drugs, drug therapy, anesthetics, vaccines, pharmacology, dosages, etc.

Koc, Y; Alkan, F; Coskun, A. **Bir devede siddetli abdominal effuzyon . [The severe abdominal effusion in a camel.]** *Veteriner Bilimleri Dergisi.* 2006; 22(3/4): 103-108. ISSN: 1011-2057. Note: In Turkish with an English summary.

Descriptors: dromedary camels, case study, severe abdominal effusion, diagnosis, laparotomy, surgical management.

Mahmood, I; Martinez, M; Hunter, RP. **Interspecies allometric scaling. Part I: prediction of clearance in large animals.** *Journal of Veterinary Pharmacology and Therapeutics.* 2006 Oct; 29(5): 415-423. ISSN: 0140-7783

DOI: http://dx.doi.org/10.1111/j.1365-2885.2006.00786.x

NAL call no: SF915.J63

Abstract: Interspecies scaling is a useful tool for the prediction of pharmacokinetic parameters from animals to humans, and it is often used for estimating a first-time in human dose. The knowledge of pharmacokinetics in veterinary species is important for dosage selection, particularly in the treatment of large zoo animal species, such as elephants, giant cats and camels, for which pharmacokinetic data are scant. Therefore, the accuracy in clearance predictions in large animal species, with and without the use of correction factors (rule of exponents), and the impact of species selection in the prediction of clearance in large animal species was examined. Based upon this analysis, it was determined that there is a much larger risk of inaccuracies in the clearance estimates in large animal species when compared with that observed for humans. Unlike in humans, for large animal species, correction factors

could not be applied because there was no trend between the exponents of simple allometry and the appropriate correction factor for improving our predictions. Nevertheless, we did see an indication that the exponents of simple allometry may alert us as to when the predicted clearance in the large animal may be underestimated or overpredicted. For example, if a large animal is included in the scaling, the predicted clearance in a large animal should be considered overestimated if the exponent of simple allometry is >1.3. Despite the potential for extrapolation error, the reality is that allometric scaling is needed across many veterinary practice situations, and therefore will be used. For this reason, it is important to consider mechanisms for reducing the risk of extrapolation errors that can seriously affect target animal safety, therapeutic response, or the accuracy of withdrawal time predictions.
Descriptors: elephants, giant cats, camels,zoo animals, body weight, pharmacokinetics, dosage, allometry, drug excretion, half life, prediction, equations, mathematical models, risk factors, humans, veterinary medicine, risk reduction, drug therapy, interspecies allometric scaling, body clearance time, correction factors, errors, withdrawal time.

Mochabo, MOK; Kitala, PM; Gathura, PB; Ogara, WO; Eregae, EM; Kaitho, TD; Catley, A. **The socio-economic impact of important camel diseases as perceived by a pastoralist community in Kenya.** *Onderstepoort Journal of Veterinary Research.* 2006; 73(4): 269-274. ISSN: 0030-2465
Abstract: The objective of the study was to assess the socioeconomic impact of camel trypanosomiasis (surra) according to the perceptions of the pastoralists community in Kenya. Four livestock grazing units were conveniently selected and in each of them, three groups of key informants comprising five to eight persons were selected for the participatory exercises. Five camel diseases were listed in order of importance according to their severity and frequency of occurrence including trypanosomiasis, mange, non-specific diarrhoea, tick infestations and haemorrhagic septicaemia. The losses listed as incurred due to the five diseases were: losses in milk, meat, blood, fats and hides, dowry payments, depreciation in sale of animals, losses due to infertility and abortions and losses due to the cost of treatment. It was observed that there was good agreement ($P<0.05$) between the informant groups on the losses incurred as a result of the diseases for all the selected loss indicators. Surra and mange were given high median scores on all the indicators while non-specific diarrhoea, tick infestations and haemorrhagic septicaemia received moderate median scores. It is concluded that the camel plays a central role in the lives of Turkana pastoralists and that surra has a devastating social and economic impact. There is a need for veterinary and policy decision-makers to focus more attention on the control of surra in this arid and semi-arid area of Kenya.
Descriptors: dromedary camels, mange, parasitoses, pastoral society, protozoal infections, trypanosomiasis, *Trypanosoma evansi*, diarrhea, parasitic diseases, parasitic infestations, parasitosis, protozoal diseases, scouring, losses, socio-economic aspects, trypanosomosis, Kenya.

Mosaad, AA; Elbagory, AR; Khalid, AM; Waters, WR; Tibary, A; Hamilton, MJ; Davis, WC. **Identification of monoclonal antibody reagents for use in the study of the immune response to infectious agents in camel and water buffalo.** *Journal of Camel Practice and Research.* 2006; 13(2): 91-101. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: Progress in elucidating the mechanisms regulating the immune response to

infectious agents and derived vaccines in domestic species, especially in camels and water buffaloes, has been impeded by the lack of monoclonal antibody (mAb) reagents needed to study the immune response in the species of interest. As a first step to address this problem, we conducted a study to determine how many existing mAbs developed against leukocyte differentiation molecules (LDM) in various species recognize conserved epitopes on orthologous (identical) molecules in two or more species of Artiodactyla. Analysis of 490 monoclonal antibodies raised against LDM in cattle, goat, sheep, llama, pig, dog and human revealed that many epitopes have been conserved on orthologous molecules in the course of evolution in closely related species in the suborder Ruminantia such as in cattle, bison and water buffalo, and fewer on more distantly related species such as goat and sheep. Only a few of the epitopes conserved in Ruminantia were conserved in the suborders Suiformes (pigs) and Tylopoda (llamas and camels). The highest level of conservation in all suborders was found with major histocompatibility complex (MHC) class I (MHC I) and class II (MHC II) molecules. These findings show the potential as well as the limitations of screening existing mAbs for research in less use studied species. Importantly, the findings also provide further insight into the composition of the immune system in Artiodactyla and factors to be considered when studying the immune response to infectious agents and vaccines in the different suborders of Artiodactyla. Reproduced with permission of CAB.
Descriptors: dromedary camels, Bactrian camels, bison, buffaloes, cattle, dogs, goats, llamas, humans, rabbits, pigs, sheep, epitopes, evolution, immune response, immune system, immunity, major histocompatibility complex, monoclonal antibodies, antigenic determinants, histocompatibility complex, immunological reactions.

Navneet Rohilla; Umed Singh. **Retention of placenta in female camel (*Camelus dromedarius*).** *Indian Journal of Animal Reproduction.* 2006; 27(1): 89-90. ISSN: 0970-2997
Abstract: An 8-year-old pluriparous female camel is presented at the Government Veterinary Hospital, Dheerwas, Churu, Rajasthan, India with a history of fetal membrane retention. The temperature, pulse and respiration rates were normal but vaginal examination revealed fetal membranes were present in the uterus. The animal was initially treated with 60 IU oxytocin in 1 litre of 5% DNS administered in a slow iv drip. A day after, the perineal area was washed with soap and water, and 500 ml povidone-iodine solution mixed with 500 ml metronidazole was infused to the uterus. 200 ml exapar and 100 ml ostocalcium were given orally twice a day for 3 days. Fetal membranes were spontaneously passed after 24 h of treatment and the animal recovered without complications. Reproduced with permission of CAB.
Descriptors: dromedary camels, case report, uterus, fetal membrane, placenta retention, clinical aspects, diagnosis, treatment, drug therapy; fetal membranes; parturition complications, Rajasthan, India.

Pieroni, A; Giusti, ME; Pasquale, C de; Lenzarini, C; Censorii, E; Gonzales-Tejero, MR; Sanchez-Rojas, CP; Ramiro-Gutierrez, JM; Skoula, M; Johnson, C; Sarpaki, A; Della, A; Paraskeva Hadijchambi, D; Hadjichambis, A; Hmamouchi, M; El Jorhi, S; El Demerdash, M; El Zayat, M; Al Shahaby, O; Houmani, Z; Scherazed, M. **Circum-Mediterranean cultural heritage and medicinal plant uses in traditional animal healthcare: a field survey in eight selected areas within the RUBIA project.** *Journal of Ethnobiology and Ethnomedicine.* 2006; 2(16): (24 March 2006). ISSN : 1746-4269

URL: http://www.ethnobiomed.com/content/pdf/1746-4269-2-16.pdf
Abstract: During the years 2003-2005, a comparative ethnobotanical field survey was conducted on remedies used in traditional animal healthcare in eight Mediterranean areas. The study sites were selected within the EU-funded RUBIA project, and were as follows: the upper Kelmend Province of Albania; the Capannori area in Eastern Tuscany and the Bagnocavallo area of Romagna, Italy; Cercle de Ouezanne, Morocco; Sierra de Aracena y Picos de Aroche Natural Park in the province of Huelva, Spain; the St. Catherine area of the Sinai Peninsula, Egypt; Eastern and Western Crete, Greece; the Paphos and Larnaca areas of Cyprus; and the Mitidja area of Algeria. One hundred and thirty-six veterinary preparations and 110 plant taxa were recorded in the survey, with Asteraceae and Lamiaceae being the most quoted botanical families. For certain plant species the survey uncovered veterinary phytotherapeutical indications that were very uncommon, and to our knowledge never recorded before. These include *Anabasis articulata* (Chenopodiaceae), *Cardopatium corymbosum* (Asteraceae), *Lilium martagon* (Liliaceae), *Dorycnium rectum* (Fabaceae), *Oenanthe pimpinelloides* (Apiaceae), *Origanum floribundum* (Lamiaceae), *Tuberaria lignosa* (Cistaceae), and *Dittrichia graveolens* (Asteraceae). These phytotherapeutical indications are briefly discussed in this report, taking into account modern phytopharmacology and phytochemistry. The percentage of overall botanical veterinary taxa recorded in all the study areas was extremely low (8%), however when all taxa belonging to the same botanical genus are considered, this portion increases to 17%. Nevertheless, very few plant uses were found to be part of a presumed "Mediterranean" cultural heritage in veterinary practices, which raises critical questions about the concept of Mediterraneanism in ethnobotany and suggests that further discussion is required. Nearly the half of the recorded veterinary plant uses for mammals uncovered in this survey have also been recorded in the same areas in human folk medicine, suggesting a strong link between human and veterinary medical practices, and perhaps also suggesting the adaptive origins of a few medical practices. Since most of the recorded data concern remedies for treating cattle, sheep, goats, and camels, it would be interesting to test a few of the recorded phytotherapeuticals in the future, to see if they are indeed able to improve animal healthcare in breeding environments, or to raise the quality of dairy and meat products in the absence of classical, industrial, veterinary pharmaceuticals.
Descriptors: sheep, goats, camels,ethnobotany, folk veterinary medicines, health care, lilies, medicinal plants, *Anabasis articulata* (Chenopodiaceae), *Cardopatium corymbosum* (Asteraceae), *Lilium martagon* (Liliaceae), *Dorycnium rectum* (Fabaceae), *Oenanthe pimpinelloides* (Apiaceae), *Origanum floribundum* (Lamiaceae), *Tuberaria lignosa* (Cistaceae), and *Dittrichia graveolens* (Asteraceae), traditional veterinary medicines, pharmaceutical products, phytochemicals, plant composition, traditional medicine, veterinary medicine, veterinary practice, Albania, Algeria, Crete, Cyprus, Egypt, Greece, Italy, Morocco, Spain, Tuscany.

Sarmad Rehan; Qureshi, AS. **Microscopic evaluation of the heart, kidneys and adrenal glands of one-humped camel calves (*Camelus dromedarius*) using semi automated image analysis system.** *Journal of Camel Practice and Research.* 2006; 13(2): 123-127. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: Morphometric parameters of the heart, kidneys and adrenal glands of 26 young dromedaries aged 30-36 months were evaluated. Measurements were made using the image analysis software programme Autocad R. Among heart parameters, volumes of the cardiac

nuclei of the right atrium, left atrium, right ventricle and left ventricle were 141.9+or-6.6, 138.8+or-7.24, 151.6+or-7.4 and 151.8+or-7.0 micro m3, respectively. Means of connective tissue percentage in the right atrium, left atrium, right ventricle and left ventricle of the heart were 8.0+or-0.3, 7.7+or-0.3, 7.3+or-0.3 and 6.8+or-0.32, respectively. Among the kidneys, mean diameters of the subcapsular and juxtamedullary glomeruli were 110 and 87.3 micro m, mean volumes of the subcapsular and juxtamedullary glomeruli were 1328x103 and 630x103 micro m3, while the mean areas of subcapsular and juxtamedullary glomeruli were 11.9x102 and 7.6x103 micro m2, respectively. Statistical analysis revealed that the glomeruli of subcapsular region were significantly higher than those of juxtamedullary region. Among the adrenal glands, volume of the nuclei of zona glomerulosa was 92.7+or-4.2 micro m3 and thickness of zona glomerulosa was 1139+or-139 micro m. Reproduced with permission of CAB.

Descriptors: dromedary camels, adrenal glands, kidneys, glomerulus, heart ventricles, imagery, image analysis, histology, morphometrics.

Sena, DS; Gorakh Mal; Sharma, N; Sahani, MS. **Calf mortality in camels: a report.** *Journal of Camel Practice and Research*. 2006; 13(2): 171-172. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: The causes of mortality in dromedary camel calves aged <1 year in India were recorded from 1994-2004. The highest incidence of mortality occurred at 0-3 months, followed by 6 months-1 year and 3-6 months of age. Males had a higher mortality compared to females but was not statistically significant. Bikaneri breed had the highest mortality, followed by Jaisalmeri, Kachchhi and crossbred camels. Causes of death included heat stroke (18.367%), impaction (4.081%), encephalitis (6.122%), enteritis (26.530%), pneumonia (40.816%) and respiratory distress (2.040%). In conclusion, neonatal care of dromedary calves at 0-3 months of age is of utmost importance in order to reduce mortality. Reproduced with permission of CAB.

Descriptors: dromedary camels, calves, young animals, camel diseases, causes of death, etiology, age differences, breed differences, sex differences, epidemiological surveys, epidemiology, India.

Sharma, NK; Sharma, S. **Grain founder in a male camel (*Camelus dromedarius*).** *Journal of Veterinary Science.* 2006 Mar; 7(1): 91-92. ISSN: 1229-845X

Descriptors: dromedary camel, adult, laminitis, overfeeding, *Pennisetum glaucum*, hooves, hoof trimming, dietary fiber, case report, confinement treatment, India.

Tej Singh; Sharma, GD; Singh, AP; Dadhich, R; Surender Singh. **Incidence and pathology of degenerative changes in liver of camels.** *Veterinary Practitioner.* 2006; 7(1): 35-36. ISSN: 0972-4036

Descriptors: camels, liver sampling, infections, toxicities, histopathology of 137 samples, degenerative changes, cloudy, swelling, hydropic degeneration, fatty changes.

Zama, MMS; Bhardwaj, HR; Tarunbir-Singh; Gupta, AK; Chaudhary, RN. **Dorsal patellar fixation in large animals - a review.** *Indian Journal of Field Veterinarians.* 2006; 1(4): 71-80. ISSN: 0973-3175. Note: A Review.

URL: http://www.ivri.nic.in
Descriptors: dromedary camels, alpacas, horses, llamas, patellar fixation, functional disorder, tibio femoral patellar articulation stifle joint, femur, tibia, patella, etiology, bone fractures, diagnosis, fracture fixation, lameness, medical treatment, radiography, ultrasonography.

2005

Abbas, B; Omer, OH. **Review of infectious diseases of the camel.** *Veterinary Bulletin.* 2005; 75(8): 1N-16N. ISSN: 0042-4854
URL: www.cabi-publishing.org/vb
Abstract: Camels were formerly considered resistant to most of the diseases commonly affecting livestock, but as more research was conducted, camels were found to be susceptible to a large number of pathogenic agents. For some diseases such as pox, mange, and enterotoxaemia, camels were indeed more susceptible and manifested more severe signs than other ruminants in the same ecozones. Pneumonia, mastitis and calf diarrhoea are the most common bacterial diseases of camels and are caused by a large number of microorganisms. Pox, contagious echthyma, papillomatosis and rabies are the only established viral diseases in camels. Although infection with several other viruses, including rinderpest, bluetongue, African horse sickness and rift valley fever has been demonstrated by serological methods, camels did not show signs of disease in spite of being in close contact with affected livestock. Camels also did not develop clinical signs of foot and mouth disease after housing for several weeks with affected animals. Increased interest in the camel as a multipurpose animal has been met with increased research into the aetiology and pathology of camel diseases; very few studies, however, have been directed towards their control.
Descriptors: dromedary camels, susceptibility to diseases, disease resistance, bacterial diseases, viral diseases, pneumonia, mastitis, calf diarrhea, disease control, disease resistance, enterotoxemia, infectious diseases, parasites, mange, rabies, salmonellosis, susceptibility, *Aspergillus fumigatus*, *Clostridium perfringens*, contagious ecthyma virus, papillomavirus, contagious pustular dermatitis, CPD virus, Hyphomycetes, *Salmonella* infections, scabby mouth.

Admassu, B; Nega, S; Haile, T; Abera, B; Hussein, A; Catley, A. **Impact assessment of a community-based animal health project in Dollo Ado Dollo Bay districts, southern Ethiopia.** *Tropical Animal Health and Production.* 2005 Jan; 37(1): 33-48. ISSN: 0049-4747. Note: In English with a French summary.
Descriptors: veterinary clinics, health care workers, community facilities, animal diseases, animal parasites and pests, dromedaries, cattle, sheep, goats, helminthiasis, Ethiopia.

Antoine Moussiaux, N; Faye, B; Vias, GF. **Tuareg ethnodiagnostic skill of camel diseases in Agadez area (Niger).** *Journal of Camel Practice and Research.* 2005; 12(2): 85-93. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: For generations, nomad herders have been learning to manage herd health, particularly in dromedaries, because of their high value. They have thus acquired a very comprehensive knowledge of signs of illness and have developed their own nomenclature. The present study aims at the description, scientific identification and recognition of this ethnoveterinary knowledge by means of an investigation carried out in Tuareg populations living

in the neighbourhoods of Agadez (Niger) in November 2003-January 2004. The dominant pathologies cited by herders for being the most alarming are gastrointestinal helminthoses (izni), camel calf diarrhoea (efay), tick infestations of camel calves (igardan), camel pox (erk eshik), sarcoptic mange (ajud) and bronchopneumonia (toza). Poorly identified nosologic entities are also reported. Reproduced with permission of CAB.
Descriptors: dromedary camels, etiology, camel diseases; herd health management, Tuareg nomads, traditional medicine, ethnoveterinary knowledge, diagnosis, diarrhea, helminthoses, helminthes, intestinal worms, parasitoses, pneumonia, scabies, Niger.

Bhardwaj, B; Sharma, GD; Surendra Singh; Dadhich, R; Singh, AP. **Incidence and pathology of mycotic pneumonia in camel.** *Veterinary Practitioner.* 2005; 6(1): 16. ISSN: 0972-4036
Abstract: Mycotic pneumonia was found in 5.09 per cent of total cases observed in the present investigation carried out on 157 lung samples of camel. Grossly, congestion, consolidation and grey white foci of varying size were seen. Microscopically, in diffuse pneumonic and suppurative form, mycotic bronchiolitis along with multiple suppurative foci in adjacent lung were observed. Reproduced with permission of CAB.
Descriptors: dromedary camels, lung diseases, animal pathology, histopathology, lesions, mycoses, pneumonia, respiratory diseases.

Bhardwaj, B; Sharma, GD; Singh, AP; Dadhich, R; Surender Singh. **Pathological observations of circulatory disturbances in camels.** *Veterinary Practitioner.* 2005; 6(1): 33-34. ISSN: 0972-4036
Descriptors: dromedary camels, blood circulation, cardiovascular diseases, cardiovascular system, blood clots, embolism, thrombosis, lungs, edema, respiratory pathology.

Broglia, A; Abdullah, AE; Lello, S di. **Veterinaires Sans Frontieres (VSF) projects in Sahrawi refugee camps: livestock management and veterinary service between emergency and development.** *Tropicultura.* 2005; 23(Special Edition): 53-57. ISSN: 0771-3312. Note: In English with a French summary.
Abstract: The Sahrawi people lived in Western Sahara till the Moroccan invasion in 1975. Then the Sahrawi began their exile to Algeria as refugees. Since then, approximately 150 000 Sahrawi people have been living in 4 refugee camps, in a 10 000-square-kilometre area nearby Tindouf (south west Algeria). After an initial situation of acute emergency, the refugee camps have now developed a stable political and social structure but are still dependent on humanitarian aid. This situation could now be called “chronic emergency”. The inhabitants in the camps, originally pastoralists, still have lots of animals (sheep, goats, camels, and donkeys), which are their unique source of protein. Now the Sahrawi breeders have to face new problems of animal health, linked to the sedentary conditions in the camps (lack of pasture, presence of rubbish, hygiene of animal shelters, change of husbandry, etc.). The biggest problem in animal husbandry is due to the no-grazing condition in the camps. Moreover, the animals coming from the pastures in the outer desert suffer from a strong nutritional stress. In this context, the VSF projects have been concerned in creating and supporting the local veterinary service, by providing technical assistance and monitoring the activities (meat inspection, clinical examination, laboratory diagnostics, etc.) of the veterinarians and paraveterinarians. The veterinary service would pursue animal health control, and

above all, promote correct animal management in the refugee camp context. The next step in the improvement of the livestock condition in the Sahrawi camps will be a project on forage integration, foreseen in 2005.
Descriptors: camels, sheep, goats, donkeys, livestock animal health, refugee camps, Sahrawi people Moroccan invasion and conflict, development aid, development projects, veterinary services, Veterinaires Sans Frontieres (VSF)**,** aid to camp associated livestock, Algeria.

Dixit, SK; Tuteja, FC; Singh, AP. **Some non-parasitic skin infections in camels.** *Veterinary Practitioner.* 2005; 6(2): 173-175. ISSN: 0972-4036
Descriptors: dromedary camels, wounds, injuries, skin conditions, bacterial infections, etiology, antibacterial agents, antibiotics, drug therapy, immunization, immunology, reviews, treatment, vaccination, vaccines.

Faye, B; Esenov, P. ***Desertification Combat andFood Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.*** IOS Press, Amsterdam. 2005; 225 pp
Abstract : This book gives an overview of the status of camel production, development of camel products and maintenance of animal productivity in order to satisfy human requirements both in quantity and quality. The workshop contributes to the exchange between scientists in order to allow access to new approaches and methodologies by all desert and camel scientists in the involved countries (Western European countries, Mediterranean countries and Central Asian Republics). The 4 papers presented in the plenary sessions discuss the new trends in camel sciences, desertification in Central Asian countries, Arvana breed camel and the association between camel and society. A total of 14 papers give emphasis on desertification, selection, breeding and diseases of camels. Camel keeping and productiveness are discussed in 16 papers. Moreover, recommendations are given. Reproduced with permission of CAB.
Descriptors: desertification, desert animals, domestication, dromedary camels, Bactrian camels, camel production, pasteurizing, grazing behaviors, reproductive performance, selective camel breeding, camel genetic resources, camel-based products, camel milk production, camel milk composition, camel milk products, sour milk, lactoferrin, leptin, lipids, fiber products, fleece, wool, adipocytes, disease prevention, infectious-diseases, mycoses, probiotics, therapy,

Ghulam Muhammad; Khan, MZ; Hussain, MH; Zafar Iqbal; Muhammad Iqbal; Muhammad Athar. **Ethnoveterinary practices of owners of pneumatic-cart pulling camels in Faisalabad City (Pakistan).** *Journal of Ethnopharmacology.* 2005; 97(2): 241-246. ISSN: 0378-8741
Abstract: The present study was planned to investigate the ethnoveterinary methods practiced by the owners of pneumatic-cart pulling camels in Faisalabad Metropolis (Pakistan). During a 7-year-period (November 1992-November 1999), 200 owners of draught camels working in the city were interviewed. Information concerning the ethnoveterinary practices for the treatment of common disorders of digestive tract (indigestion, colic and diarrhea), respiratory tract (cold/rhinitis, pneumonia), skin problems (mange, ulceration of nostrils with or without nasal myiasis, ticks and lice, harness sores), systemic states (fever, anhidrosis) and preventive therapy of indigestion and halitosis was collected through interviews and collated with those documented for the treatment of desert-dwelling camels. Familiar-

ity of owners with two traditional methods of surra (trypanosomiasis) diagnosis ('Sand-ball test' and 'Hair-stick test') known to pastorilists was also probed. In addition, the dose and frequency of use of common salt was investigated. Traditional inputs utilized by the camel owners included various plant products, insecticides, sulphur, sump oil, common salt, aspirin, naphthalene balls and milk fat. Different owners used different combinations of traditional drugs for the treatment of disorders/conditions investigated. None of the camel owners was found familiar with the 'Sand-ball test' or 'Hair-stick test' of trypanosomiasis diagnosis. For the prevention of indigestion and halitosis all camel owners had practiced administration of 'massaulas' (physic drench/balls) along with common salt (average 250 g) on weekly basis. In general, the ethnoveterinary treatment practices used by the owners of city-dwelling camels appear to be different from those documented for the treatment of diseases of desert-dwelling camels.

Descriptors: draft camels in an urban environment, cart pulling camels, working camels, camel diseases, colic, diarrhea, dyspepsia, mange, parasitoses, parasitic infections, pneumonia, respiratory diseases, rhinitis, skin diseases, harness sores, injuries, *Trypanosoma evansi*, trypanosomiasis, myiasis, causal agents, diagnosis, disease prevention, ethnicity folk medicine, traditional medicine, ethnic differences, medicinal plants, plant extracts, aspirin, acetylsalicylic acid, insecticides, milk fat, naphthalene, plant extracts, ethnoveterinary care, salt, elemental sulfur, surveys, Pakistan.

Johnson, LW. **Routine camelid procedures.** In: RA. Smith (Editor). *Proceedings of the Thirty Eighth Annual Convention, American Association of Bovine Practitioners, Salt Lake City,-Utah, USA, 24-24 September, 2005*. Published by the Association. 2005; 120-122

Abstract: To help the relative novice and perhaps even some veteran camelid veterinarians, the most common procedures that you are asked to perform will be discussed. Included will be venapuncture procedures, some dental considerations, male breeding soundness evaluation, anesthesia/castration technique, micro-chipping, intrauterine infusion discussion, TB testing, intramuscular injection options, tapeworm treatment, epidural procedure, refractory abscess therapy, pregnant animal sedation and rectal exams. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel health, control programs, diagnosis, disease control, drug therapy, treatment, veterinarians, chemotherapy, control programs, veterinary surgeons.

Mbaria, JM; Munenge, RW; Njuguna, AN; Orre, JL; Dabasso, D. **Occurrence of a severe acute livestock poisoning by borehole water in Marsabit District, Kenya: a case study.** *The Kenya Veterinarian.* 2005; 28: 16-19.

Abstract: This article reports on an outbreak of acute livestock poisoning by borehole water in Kargi, Marsabit District, Kenya in 2000. The borehole had been out of use for 3 years and after rehabilitation, 7000 animals died within a day after drinking the water. The most affected were sheep, goats, cattle, camels and dogs with mortalities of up to 90%. Donkeys and humans were only mildly affected with no deaths reported. Clinical signs occurred within one hour after drinking the water. Initially, the animals displayed increased frequency of urination followed by symptoms of respiratory insufficiency comprising of dyspnoea, cyanosis, rapid and weak pulse and general weakness. The signs progressed into methaemoglobinuria, severe pain, trembling, convulsions, collapse, coma and death within hours.

Rapid decomposition, brown discolouration of the mucous membranes, gastrointestinal tract corrosion and cooked appearance of the visceral organs were observed at postmortem. Water samples collected from the borehole and neighbouring wells were found to contain arsenic (0.2-66.8 ppb), selenium (1.1-4.4 ppb), lead (0.0.1-0.02 ppm) and nitrates (450-950 ppm) and other contaminants. The deaths were probably due to acute nitrate poisoning. Reproduced with permission of CAB.
Descriptors: camels, cattle, dogs, sheep, goats, donkeys, humans, arsenic, lead, nitrate, selenium, drinking water contamination, poisoning outbreaks, case reports, clinical aspects, lesions, livestock post mortems, mineral content of water, Kenya.

Mochabo, KOM; Kitala, PM; Gathura, PB; Ogara, WO; Catley, A; Eregae, EM; Kaitho, TD. **Community perceptions of important camel diseases in Lapur Division of Turkana District, Kenya.** *Tropical Animal Health and Production.* 2005; 37(3): 187-204. ISSN: 0049-4747.
Note: In English with a Spanish and French summary.
DOI: http://dx.doi.org/10.1023/B:TROP.0000049301.15826.78
Abstract: This paper presents the results of a study conducted in Lapur Division of Turkana District, Kenya, to estimate the incidence and mortality of camel trypanosomosis using participatory methods. Four livestock camps ('adakars') were conveniently selected for the study. Four informant groups comprising 6-8 key persons were used for the participatory exercises. The camel diseases identified by the pastoralists in their order of importance according to annual incidence were: trypanosomosis (11.4%); mange (10.8%); tick infestation (7.9%); haemorrhagic septicaemia (7.7%); and non-specific diarrhoea (7.6%). Almost half (49.3%) of the camel population suffered from at least one disease over the previous year. The annual incidence and mortality rates of trypanosomosis were estimated at 15% and 9.9% in adult camels and 6.9% and 5.2% in young camels, respectively. There was a seasonal occurrence of trypanosomosis, with most cases reported in the dry season. The prevalence levels of the disease reportedly declined from about 100% in 1978 to an almost stable state of about 15% in 2002. This study revealed that camel trypanosomosis is still an important disease in Turkana District, exacting a heavy toll in terms of morbidity and mortality. The economic losses due to the disease were likely to have been great owing to the central role the camel plays in this arid district of Kenya.
Descriptors: dromedary camels, diseases of important, hemorrhagic septicemia, mange, *Trypanosoma*, trypanosomiasis, losses, mortality, Kenya.

Muhammad, G; Khan, MZ; Hussain, MH; Iqbal, Z; Iqbal, M; Athar, M. **Ethnoveterinary practices of owners of pneumatic-cart pulling camels in Faisalabad City (Pakistan)** .*Journal of ethnopharmacology.* 2005 Feb 28; 97(2): 241-246. ISSN: 0378-8741
Descriptors: camels, draft animals, traditional medicine, veterinary medicine, indigenous knowledge, medicinal plants, veterinary drugs, therapeutics, ethnoveterinary medicine, city dwelling camels, desert dwelling camels, traditional veterinary drugs, animal owners, Pakistan.

Muhammad, SA; Farooq, AA; Akhtar, MS; Hayat, CS. **Parturient udder oedema in a dromedary camel (*Camelus dromedarius*).** *Pakistan Veterinary Journal.* 2005; 25(2): 100. ISSN: 0253-8318

Abstract: A 10 year old female dromedary camel was examined two days after parturition for the treatment of udder swelling that started developing two days before parturition. The animal had normal body temperature. The swelling was soft and cold and involved udder only, while no teats were involved. A marked decrease in blood haemoglobin level was noted. The animals responded to treatment and recovered within three days.
Descriptors: dromedary camels, udders, post parturition, mammary edema, nematode infections, body temperature, case report, clinical aspects, clinical examination; feces, hemoglobin.

Navneet Rohilla; Umed Singh. **Retention of placenta in she camel (*Camelus dromedarius*): a case report.** *Haryana Veterinarian.* 2005; 44: 91-92. ISSN: 0033-4359
Abstract: The incidence of fetal membrane retention in camels is low, however, if the case is not handled immediately, it may prove fatal. An 8-year-old female camel was brought to the veterinary hospital with a history of fetal membrane retention. The calf was removed by the owner by traction, but the fetal membranes were not expelled for >10 h after delivery. The animal was given 60 I.U. oxytocin mixed with 1 litre of 5% DNS intravenously. Then, 500 ml of povidone iodine mixed with 500 ml metronidazole (intrauterine), 200 ml expar and 100 ml ostocalcium (oral) were administered the next day. The same treatment was repeated for another two days. The fetal membranes were expelled 24 h after the start of treatment and the animal recovered without any complication.
Descriptors: dromedary camels, clinical aspects, oxytocin, ocytocin, placental retention, puerperal disorders, reproductive disorders, Rajasthan, India.

Nourani, H; Tafti, AK; Kafi, M. **Pathological study of the uterine tubes in non-pregnant camels (*Camelus dromedarius*) slaughtered in Yazd province, Iran.** *Iranian Journal of Veterinary Research.* 2005; 6(3(Ser. 13)): 79-83. ISSN: 1728-1997. Note: In English with a Persian summary.
URL: http://www.sums.ac.ir/~parasito
Abstract: This study was undertaken to investigate the prevalence and characteristics of uterine tube abnormalities of female camels. The uterine tubes of genital tracts of 96 slaughtered non-pregnant camels were examined grossly and microscopically. The pathological changes observed were salpingitis (2.08%), uterine tube duplication (1.04%), accessory uterine tubes (1.04%), segmental aplasia and hydrosalpinx with cystic hyperplasia of the uterine tubes, ovary and uterus (1.04%). The effects of these abnormalities on fertility of these camels were not detected because the history of their reproduction was not available. Uterine tube duplication, accessory uterine tubes and simultaneous occurrence of cystic changes in uterine tubes, ovary and uterus are reported in dromedary camels for the first time. Reproduced with permission of CAB.
Descriptors: dromedary camels, uterus, fallopian tubes, uterine diseases, ovaries, oviducts, pathology, reproductive disorders, salpingitis, salpinges, Iran.

Qureshi, ZI; Iqbal, M; Wahab, A; Yass, R; Naif, M. **Transverse vaginal septum: a congenital malformation and its management in a female dromedary camel.** *Pakistan Veterinary Journal.* 2005; 25(1): 45-46. ISSN: 0253-8318
Abstract: A seven year old female dromedary camel in the United Arab Emirates was examined for the complaint of inability to breed due to problem during penile intromission [date

not given]. Vaginoscopy, using equine tube vaginoscope, revealed the presence of a tissue flap cranial to the urethral opening, buldging caudally and separating the cranial and caudal parts of vagina. Digital palpation was also performed and the condition was diagnosed as transverse vaginal septum. For treatment, the vaginal septum was grasped with an Allis tissue forceps and a circular piece was severed from the centre with the Metzenbaum scissors. The remaining portion of septum was then carefully trimmed. About 28 days after surgery, the animal showed heat signs and was mated. Ultrasonographic examination after three months showed that the animal was pregnant.
Descriptors: dromedary camels, congenital abnormalities, transverse vaginal septum, case-reports, clinical aspects, surgical repair, United Arab Emirates.

Saidabadi, Mohammad Sadegh. **Clinical pregnancy diagnosis in dromedary camel**. *Biology of Reproduction.* 2004; (Sp. Iss. SI): 118. ISSN: 0006-3363. Note: "37th Annual Meeting of the Society for the Study of Reproduction, Vancouver, Canada; August 01-04, 2004."
URL: http://www.biolreprod.org/
Descriptors: dromedary camels, females, pregnancy status, pregnancy, clinical diagnosis, diagnostic techniques.

Simmons, HA; Fitzgerald, SD; Kiupel, M; Rost, DR; Emery, RW. **Multicentric T-cell lymphoma in a dromedary camel (*Camelus dromedarius*).** *Journal of Zoo and Wildlife Medicine.* 2005; 36(4): 727-729. ISSN: 1042-7260
URL: http://jzwm.allentrack.net/cgi-bin/main.plex
Abstract: A 7-yr-old female dromedary camel (*Camelus dromedarius*) was evaluated for inappetence, weight loss, polyuria, and polydipsia. The animal did not respond to antibiotic and supportive therapy, became recumbent, and died. Gross examination revealed nodules in the liver, mesenteric and perirenal lymph nodes, and both kidneys, with segmental thickening of the small intestine. Histopathologic examination revealed multifocal lymphoma with moderate mitotic activity. Immunohistochemical staining of neoplastic cells was uniformly CD3-positive, indicating a T-cell lymphoma.
Descriptors: dromedary camels, neoplasms, lympnoma cancer, T-lymphocytes, CD3+ lymphocytes, case reports, clinical aspects, diagnosis, mortality, death rate, Michigan, US.

Smith, RA. (Editor). ***Proceedings of the Thirty-Eighth Annual Convention, American Association of Bovine Practitioners, Salt Lake City, Utah, USA, 24-26 September, 2005.*** Published by the Association. 2005. 298 p.
Abstract: Research on the various aspects of livestock raising and husbandry, including bovines (cattle and buffaloes), small ruminants (sheep) and camelids, are presented. The topics include aspects of certain communicable and non-communicable diseases, such as clinical manifestations, diagnosis, treatment, control and prevention, as well as the effects of feeding and disease on livestock productivity, especially in beef and dairy herds.
Descriptors: cattle, dromedary camels, sheep, buffaloes, antiinfective agents, bacterial diseases, beef herds, dairy herds, diagnosis, disease prevention, infectious diseases, livestock feeding, medical treatment, protozoal infections, reproductive disorders, antimicrobials, bacterial infections, bacterioses, communicable diseases, protozoal diseases.

Wernery, U. **The most important infectious diseases in camelids.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 67-69. ISBN 1586034731

Descriptors: camelids, dromedary camels, Bactrian camels, anthrax, aspergillosis, brucellosis, coccidioidomycosis, coccidiosis, endotoxemia, enterotoxemia, melioidosis, mycoses, nematode, infections, paratuberculosis, Johne's disease, pasteurellosis, rabies, salmonellosis, scabies, smallpox, trematode infections, trypanosomiasis, tuberculosis, zoonoses, influenza, *Aspergillus*, *Bacillus anthracis*, borna disease virus; *Brucella*, *Burkholderia pseudomallei*, *Clostridium perfringens*, *Coccidioides immitis*, Digenea, *Eimeria*, equid herpesviruses; *Mycobacterium avium* subsp *paratuberculosis*, *Mycobacterium tuberculosis*, *Nematoda*, *Pasteurella*, rabies virus, *Rhodococcus* bacteria, *Rickettsia*, Rotavirus, *Salmonella* infections, *Sarcoptes scabiei*, *Trypanosoma evansi*.

2004

Al Ani, Falah Khalil Abdul Razzak (Editors). ***Camel Management and Diseases***. Amman: Dar Ammar Book Pub., c2004. xvi + 455pp. ISBN 9957445006; 9789957445003. Note: With 16 consultant contributors." Includes bibliographical references and index.

NAL call no: SF997.5.C3.A43 2004

Abstract: This is a reference book on camels and includes 30 chapters that deal with the different aspects of camel management and diseases. Most chapters are on the dromedary but there is a chapter on Bactrian camel and one on South American camelids. The book also covers the socio-economics of the camel in nomadic life and the history of the camel in pre-Islamic and in Islamic society, and camel sports. Most of the chapters are devoted to the physiology and diseases of the various body systems, diseases by pathogen type (viral, bacterial, parasitic, and fungal), clinical examination, anaesthesia and surgery, nutrition and digestion, management and husbandry. The text is supported by numerous black and white photographs. Reproduced with permission of CAB.

Descriptors: dromedary camels, Bactrian camels, camel diseases, camel husbandry, camel breeding, camel nutrition, camel physiology, infectious diseases, reproduction, diagnostic techniques, therapy, etc.

Al Dughaym, AM**. Some endotoxin-induced clinical and biochemical changes in plasma of camels (*Camelus dromedarius*).** *Veterinary Research Communications.* 2004 Nov; 28(8): 711-718. ISSN: 0165-7380

DOI: http://dx.doi.org/10.1023/B:VERC.0000045956.68656.43

Abstract: Intravenous administration of endotoxin, prepared from *E. coli* serotype O55:B5, at a dose of 0.1 micro g/kg body weight to calves and adult camels induced fever and increased haematocrit, triiodothyronine and cortisol values. The endotoxin-treated animals showed significantly decreased ($p<0.05$) total protein, urea, glucose and creatinine. A significant increase was seen in the activity of aspartate aminotransaminase and creatine kinase. These results demonstrate high sensitivity of camels to endotoxin. Reproduced with permission of CAB.

Descriptors: camels, endotoxins, endotoxemia, blood plasma, blood chemistry, *Escherichia coli*, young animals, adult animals, hematocrit, triiodothyronine, cortisol, blood proteins, urea, blood glucose, creatinine, aspartate transaminase, creatine kinase, enzyme activity, body temperature, lipopolysaccharides, *Escherichia* infections.

Al Ghamdi, Ali S; AlGadhi, Saad A. **Warning signs as countermeasures to camel-vehicle collisions in Saudi Arabia.** *Accident Analysis and Prevention.* 2004; 36(5): 749-760. ISSN: 0001-4575.
Descriptors: camels, rural roads, vehicle collusions problems, counter measures to prevent losses, camel crossing warning signs study, vehicle speed reduction observed, 3-7 miles/hour reduction, tested, results of the signs in accident prevention, evaluation of signs, triangular sign with black silhouette and diamond reflective material twice standard size, field study techniques, Saudi Arabia.

Al Khedhairy, Abdulaziz Ali A. **Characterization of the nucleotide sequence of a polyubiquitin gene (PUBC1) from Arabian camel, *Camelus dromedarius*.** *Journal of Biochemistry and Molecular Biology.* 2004; 37(2): 144-147. ISSN: 1225-8687
URL: http://www.jbmb.or.kr/view_article.php3?cont=jbmb&kid=163&mid=2&pid=2
Abstract : Molecular amplification and sequencing of genomic DNA that encodes camel polyubiquitin (PUBC1) was performed by a polymerase chain reaction (PCR) using various sets of primers. The amplification generated a number of DNA fragments, which were sequenced and compared with the polyubiquitin coding sequences of various species. One DNA fragment that conformed to 325 bp was found to be 95 and 88% homologous to the sequences of human polyubiquitin B and C, respectively. The DNA translated into 108 amino acids that corresponded to two fused units of ubiquitin with no intervening sequence, which indicates that it is a polyubiquitin and contains at least two units of ubiquitin. Although, variations were found in the nucleotide sequence when compared to those of other species, the amino acid sequence was 100% homologous to the polyubiquitin sequences of humans, mice, and rats. This is the first report of the polyubiquitin DNA coding sequence and its corresponding amino acid sequence from camels, amplified using direct genomic DNA preparations.
Descriptors: dromedary camels, humans, mice, rats, polyubiquitin sequences, molecular genetics, gene sequencing, PCR amplification, lab techniques, species comparison.

Al Qarawi, AA; El Belely, MS. **Intratesticular morphometric, cellular and endocrine changes in dromedary bulls exhibiting azoospermia.** *Veterinary Journal.* 2004; 167(2): 194-201. ISSN: 1090-0233
DOI: http://dx.doi.org/10.1016/S1090-0233(03)00116-3
NAL call no: SF601.V484
Abstract: Twenty bulls, aged 7-12 years and selected from six dromedary farms were used in this study. Fifteen previously fertile animals were divided into fertile (controls) and infertile groups on the basis of abnormal scrotal contents following palpation and azoospermic ejaculates collected by electroejaculation. An examination of the clinical and histological findings as well as the testicular patterns of oestradiol-17 beta , testosterone and histamine indicated that three bulls displayed normal ranges comparable to the controls but with bilateral spermatocoeles in the caput epididymides in conjunction with the soft texture of the

testicles. Seven bulls showed moderate testicular firmness and springiness, a marked increase in testicular oestradiol-17 beta and histamine concentrations, and increases in surface area, density of mast cells and percentages of seminiferous tubules containing premeiotic spermatogenic cells as well as decreases in testicular testosterone concentrations, surface area of Leydig cells and diameter of the seminiferous tubules. The remaining five infertile animals had small hard testicles, supranormal testicular testosterone concentrations, baseline values of testicular oestradiol-17 beta and histamine, decreased numbers of Sertoli and mast cells, with a predominance (98.2%) of seminiferous tubules containing spermatogonia resting on a thickened tubular basement membrane. The results provide information on the relationship between gonadotrophin, testicular oestrogen, androgens and histamine as well as spermatogenesis in normal and azoospermic dromedary bulls.
Descriptors: dromedary camels, males, camels bulls, male genital diseases, androgens, ejaculation, estradiol, gonadotropins, histamine, histopathology, sperm, testes, scrotum, seminiferous tubules, spermatogenesis.

Anderson , DE . **Orthopaedic injuries in small ruminants.** *Proceedings of the Thirty Seventh Annual Conference, American Association of Bovine Practitioners, Fort Worth, Texas, USA, 23-25 September, 2004.* 2004; 135-139. ISSN: 0743-0450
Descriptors: sheep, goats, camelids, orthopedic injuries, fractures, infectious arthritis, facture fixations, surgery, treatments, clinical picture.

Anderson , DE . **Common surgical procedures in camelids.** *Proceedings of the Thirty Seventh Annual Conference, American Association of Bovine Practitioners, Fort Worth, Texas, USA, 23-25 September, 2004.* 2004; 118-125. ISSN: 0743-0450
Descriptors: dromedary camels, llamas, alpacas, surgical procedures, castration, teeth, tooth diseases, abscesses, leg bone trauma, bone diseases, castration, digestive tract, anesthetics, analgesics, postoperative care.

Anderson , DE . **Urogenital surgery, including mastectomy.** *Proceedings of the Thirty Seventh Annual Conference, American Association of Bovine Practitioners, Fort Worth, Texas, USA, 23-25 September, 2004.* 2004; 115-117. ISSN: 0743-0450
Descriptors: small ruminants, camelids, common surgical procedures, mastectomy, C section surgery, urethral obstruction, urogenital system.

Anderson , DE ; Whitehead, C. **Neurological disease in camelids.** *Proceedings of the Thirty Seventh Annual Conference, American Association of Bovine Practitioners, Fort Worth, Texas, USA, 23-25 September, 2004.* 2004; 140-145. ISSN: 0743-0450
Descriptors: dromedary camels, differential diagnosis, heat stress, listeriosis, meningitis, nervous system diseases, neurology, septicemia, blood poisoning, neuropathy.

Bishnoi, P; Gahlot, TK. **Ophthalmic affections in camels (*Camelus dromedarius*).** *Veterinary Practitioner.* 2004; 5(2): 89-93. ISSN: 0972-4036
Abstracts: The ophthalmic affections in camels were recorded over a time-period of two years, these affections were then classified according to the part of the eye affected. The etiology and diagnosis of these affections was ascertained on the basis of clinical history and

examination. The most common affections were keratitis, keratoconjunctivitis, corneal opacity, eyelid laceration and rupture of the eyeball. Various surgico-therapeutic or therapeutic treatments adopted for these affections were similar to those described for other animals and were found efficacious.
Descriptors: dromedary camels, eye diseases, clinical aspects, clinical examination, eyelids, eyes, keratitis, keratoconjunctivitis, medical treatment, opacity, surgery.

Bishnoi, P; Gahlot, TK. **Surgical procedures of female reproductive system in camel (*Camelus dromedarius*).** *Intas Polivet.* 2004; 5(2): 280-282. ISSN: 0972-1738
Descriptors: dromedary camels, females, common surgical procedures, ovariectomy, Caesarean section, reproductive disorders, perineal laceration, atresia vulvi.

Bishnoi, P; Gahlot, TK. **Surgical disorders of reproductive tract in male camel (*Camelus dromedarius*).** *Intas Polivet.* 2004; 5(2): 275-278. ISSN: 0972-1738
Descriptors: dromedary camels, males, reproductive tract, pathological conditions, surgical intervention, phimosis, paraphimosis, prepuce swelling, urolithiasis, scrotal and testicular trauma, hydrocele, pyocele, testicular hematoma, orchitis, testicular degeneration, scirrhous cord, cryptorchidism.

Brown, A. **A review of camel diseases in Central Australia.** *Technical Bulletin Department of Business, Industry and Resource Development, Northern Territory Government.* 2004; (314): i + 16 pp. ISSN: 1032-965X
Abstract: This publication summarizes existing information on the health status of camels in Central Australia. For the purposes of this report, Central Australia includes the arid areas of the Northern Territory, Western Australia, South Australia and Queensland in the vicinity of the Simpson, Great Sandy and Tanami deserts. The information presented is based on industry reports, abattoir monitoring, and 267 recorded veterinary field studies. The results of tests conducted on 48 consignments of camels shipped to the USA, Cuba and Southeast Asia are also included in the 267 investigations.
Descriptors: camels, status of health, post slaughter monitoring, veterinary field study data, Northern Territory, Queensland, South Australia, Western Australia, Northern Territory of Australia.

Gahlot, TK; Jhirwal, SK; Bishnoi, P; Parashar, MC. **Facial paralysis, glossoplegia and injured soft palate in a camel.** *Journal of Camel Practice and Research.* 2004; 11(2): 157-158. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Descriptors: dromedary camel, facial paralysis, diagnosis, soft palate injury, glossoplegia, therapy and surgical repair, case report, India.

Jhirwal , SK ; Gahlot, TK; Bishnoi, R; Dhadich, H; Qureshi, SM. **Rectal prolapse caused by a fibroma in a she camel - a case report.** *Journal of Camel Practice and Research.* 2004; 11(1): 77. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com

Descriptors: dromedary camel, female, case report, rectal prolapse, clinical aspects, surgical removal, diagnosis, fibroma, histopathology, neoplasms.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Osmolal and water clearances in dromedary camels during hot and cold ambience.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 628-633. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, water clearances, water intake, water excretion, urine, urination, blood chemistry, body temperature regulation, dehydration, diuresis, drinking, kidney function, glomerular filtration rate, heat stress, osmotic pressure, reabsorption, rehydration, renal function, seasonal variation, stress, stress response.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Effect of season and dehydration on phenolsulphonphthalein fractional clearance in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 616-627. ISBN: 8190114123
Descriptors: dromedary camels, physiological effects of dehydration, rehydration, phenolsulphonphthalein, dyes, kidneys, renal clearance, renal function tests, diagnostic techniques, winter and summer variations.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Some renal functions of Indian dromedary camels with glucose loading during dehydration and rehydration in winter and summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 607-615. ISBN: 8190114123
Descriptors: dromedary camels, renal function, water metabolism, glucose loading, dehydration and rehydration comparison study, water uptake, winter and summer variations, blood glucose, kidney function, glomerular filtration-rate, glucosuria, urination, dextrose.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Intravenous glucose tolerance test (IVGTT) in camels during dehydration and rehydration in winter and summer.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 607-615. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, glucose tolerance test, blood sugar, physiological dehydration, water deprivation, diagnostic techniques; environmental temperature, water intake, rehydration, relative humidity, summer and winter variations.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Thiosulphate clearance test for determination of glomerular filtration rate in dromedaries.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 585-595. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, water restriction, dehydration-physiological, diagnostic techniques, environmental temperatures, glomerular filtration rate, water rehydration, kidneys, thiosulphate renal clearance test, summer and winter variation.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Changes in glomerular filtration rate and effective renal plasma flow during seasonal water restriction in Indian camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 576-584. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, water restriction, kidneys, renal plasma flow, seasonal water restriction, flow, dehydration-physiological, glomerular filtration rate, inulin, urine, renal clearance; winter and summer seasonal variation, India.

Kataria, N; Kataria, AK; Agarwal, VK; Garg, SL; Sahani, MS. **Filtered and excreted loads of urea in different climatic conditions and hydration states in dromedary camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 568-575. ISBN: 8190114123
Descriptors: dromedary camels, water metabolism, varying climatic factors, environmental temperatures, dehydration and rehydration, physiological, water intake, kidneys, glomerular filtration, renal clearance, renal function, urea, urination, India.

Kataria, N; Gahlot, TK; Kataria, AK; Agarwal, VK; Garg, SL. **A note on catheterisation in female camels (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 565-567. ISBN: 8190114123
Descriptors: female dromedary camels, bladder, catheterization, catheters, techniques.

Kataria, N; Kataria, AK. **Use of blood analytes in assessment of stress due to drought in camel.** *Journal of Camel Practice and Research.* 2004; 11(2): 129-133. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A study was carried out to assess the stress due to drought in 83 dromedaries on the basis of variations in the values of some blood parameters. The animals belonged to farmers in India. Cortisol, aldosterone, sodium, potassium, chloride, calcium, phosphorus, proteins, urea, creatinine, vitamin A, red blood cell and white blood cell indices were measured. It was shown that the mean values of serum cortisol and aldosterone were significantly (P<=0.05) higher in camels belonging to drought-affected areas compared to those in other areas. The drought-affected camels had lowered eosinophil and lymphocyte counts and haemoglobin concentrations. Mean serum vitamin A level and total proteins were non-significantly (P>=0.05) lower in animals in drought-affected areas. The animals did not reveal any bacterial infection in the blood smears. The affected animals also did not show apparent changes in the physical health except pica in a few cases. Reproduced with permission of CAB.
Descriptors: dromedary camels, drought and heat stress effects, blood profile, blood proteins, hematology, aldosterone, retinol, vitamin A1, hydrocortisone, calcium, chloride, creatinine, eosinophils, erythrocyte count, hematology, leukocyte count, lymphocytes, nitrogen, phosphorus, potassium, sodium, India.

Kataria, N; Kataria, AK. **Blood profile during stress in dromedary camel.** *Veterinary Practitioner.* 2004; 5(2): 159-16. ISSN: 0972-4036
Descriptors: dromedary camels, stress response, blood profile while stressed, high environ-

mental temperature as a stressor,aldosterone, cortisol, blood chemistry, sodium, potassium, proteins, hydrocortisone, immunoglobulins, dextrose, hematocrit, hematology, hemoglobin, red and white blood cells, leucocytes, eosinopenia, leucocytes, lymphocytopenia, monocytopenia.

Kilic, N; Kirkan, S. **Actinomycosis in a one-humped camel (*Camelus dromedarius*).** *Journal of Veterinary Medicine Series A.* 2004; 51(7/8): 363-364. ISSN: 0931-184X
URL: http://www3.interscience.wiley.com/journal/118788793/issue
Abstract: An actinomycotic granuloma caused by *Actinomyces viscosus* is reported in a dromedary camel. Two hard, cutaneous, large granulamatous nodules were present on both sides of the postero-ventral side of the mandible exhibiting exudation and necrosis. After radical excision of the lesion, the daily treatment with penicillin-streptomycin combination was continued for 4 weeks. About 8 and 24 weeks from the initial treatment, no new nodules were noticed. Reproduced with permission of CAB.
Descriptors: dromedary camel, granulomatous nodules of the mandible, *Actinomyces viscosus* infection, clinical aspects, case study, symptoms, treatment with excision, antiobiotics, penicillin and streptomycin combination drug therapy, case report.

Kohler Rollefson, I; Rathore, HS. **Indigenous versus official knowledge, concepts and institutions: Raika pastoralists and the outside world.** *Nomadic Peoples.* 2004; 8(2): 150-167. ISSN: 0822-7942
URL: http://www.berghahnbooks.com/journals/np
Abstract: This paper is concerned with the 'indigenous knowledge' about livestock of the Raika pastoralists in Rajasthan, India, and how this indigenous knowledge articulates with the official, state-backed concepts of veterinary and animal scientists about the same subject. The paper draws attention to the very real divide that often exists between the protagonists of these two types of knowledge. With the help of three main examples (on the concepts of 'animal health', 'domestic animal diversity' and 'camel milk'), the paper shows how different conceptual frameworks result in a communicational impasse and how this failure to establish a dialogue across the boundaries of knowledge systems renders the interventions of the Rajasthan government in the livestock production sector largely ineffective. Reproduced with permission of CAB.
Descriptors: livestock, indigenous knowledge about animal health, animal production, breeds, camel milk, pastoralism, Rajasthan, India.

Mahamat, H; Mukani, WO; Mboloi, MM; Guya, SO; Krombaritis, GE. **Pregnancy diagnosis in the dromedary camel (*Camelus dromedarius*) based on a competitive progesterone enzyme linked immunosorbent assay (ELISA).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 660-664. ISBN: 8190114123
Descriptors: dromedary camels,pregnancy diagnosis, analytical methods, blood chemistry, diagnostic techniques, ELISA, pregnancy, progesterone levels, gestation.

Mohamed, HE. **A note on plasma antioxidant status in Sudanese camels (*Camelus dromedarius*) affected by musculoskeletal disorders.** *Journal of Camel Practice and Research.* 2004; 11(1): 65-66. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: This study was undertaken to determine the antioxidant status in camels (*Camelus dromedarius*) affected by 2 musculoskeletal diseases of unknown aetiology. A field survey was conducted in the Butana area of Central Sudan from January to December 2000. Camels were treated subcutaneously with 2800 IU alpha -tocopherol and intravenously with 400 ml calcium borogluconate. Blood samples were collected from the animals, and concentrations of vitamins A, C and E in plasma were determined. Out of the 2120 camels examined, 314 had Haboub's syndrome, whereas 65 had bent neck. The prevalence levels of these diseases were 18.8 and 3.0%, respectively. The levels of retinol and ascorbate were insignificantly lower, whereas alpha -tocopherol and calcium levels were significantly lower in animals affected with Haboub's and bent neck syndromes. Supplementation of alpha -tocopherol and calcium borogluconate relieved the conditions 4 days postinjection. It was concluded that Haboub's syndrome and bent neck condition were attributed to decreased levels of calcium and alpha -tocopherol in Sudanese camels. Reproduced with permission of CAB.
Descriptors: dromedary camels, Haboub's syndrome, bent neck condition, musculoskeletal anomalies, muscle diseases, disease survey, disease prevalence, plasma antioxidant status, therapy, alpha tocopherol, ascorbic acid, calcium, retinol, vitamin E, axerophthol, calcium borogluconate, myopathy, vitamin A, vitamin A alcohol, vitamin A1, vitamin C.

Nabiela, E; Fuhrmann, H; Lechner Doll, M; Sallmann, HP. **Effects of food withdrawal and dehydration on selected blood parameters of camels.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 1-2. ISBN: 8190114123
Descriptors: dromedary camels, camel nutrition, effects of diet and water restriction, blood chemistry, dehydration, fasting, food restriction, lipids, very low density lipoprotein, lipins.

Nazifi, S; Gheisari, HR. **The influences of thermal stress on serum lipids of camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 27-31. ISBN: 8190114123
Descriptors: dromedary camels, heat stress effects, stress response, serum lipids, blood chemistry, cholesterol, low density lipoprotein, seasonal variations, triacylglycerols, triglycerides, very low density lipoprotein, Iran.

Osman, N; El Sabban, FF; Al Khawli, A; Mensah-Brown, EPK. **Effect of foodstuff contamination by aflatoxin on the one-humped camel (*Camelus dromedarius*) in Al Ain, United Arab Emirates.** *Australian Veterinary Journal.* 2004 Dec; 82(12): 759-761. ISSN: 0005-0423
URL: http://www.ava.com.au/avjpast.php?journalid=9&plink=avj03.htm
Descriptors : dromedary camels, racing females, feed contamination, aflatoxins, aflatoxicosis, case studies, fever, anorexia, lymph nodes,liver, necrosis, serum albumin, hemorrhage, aspartate transaminase, alanine transaminase, gamma glutamyltransferase, blood glucose, urea nitrogen, calcium, cholesterol, triacylglycerols, phosphorus, iron, United Arab Emirates.

Osman, TEA; Al Busadah,-K A; Engelhardt, W v; Lechner Doll, M. **Effects of Ad libitum and restricted feeding on the circadian patterns of forestomach motility and rumination in camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 469-474. ISBN: 8190114123
Descriptors: dromedary camels, fore stomach, rumination, stomach motility, feeding study, ad libitum diet, restricted diet, circadian rhythm; concentrates, hay, physical activity.

Osman, TEA; Engelhardt, W. v. **Motility pattern and flow of digesta in the forestomach of the camel (*Camelus dromedarius*).** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 523-532. ISBN: 8190114123
Descriptors: dromedary camels, fore stomach motility pattern, digesta flow, regurgitation, rumination, circadian rhythm.

Rajiv Sharma. **Retention of foetal membranes in a Camelus dromedarious.** *Indian Journal of Animal Reproduction.* 2004; 25(1): 78. ISSN: 0970-2997
Descriptors: dromedary camel, case report, retention of fetal membranes, manual removal.

Sakamoto, K; Kiupel, M; Frank, N; March, PA. **Vertebral malformation, syringomyelia, and ventricular septal defect in a dromedary camel *(Camelius dromedarius*).** *Journal of Veterinary Diagnostic Investigation*. 2004; 16(4): 337-340. ISSN: 1040-6387
URL: http://jvdi.org/cgi/reprint/16/4/337
Abstract: An occipitoatlantoaxial malformation and ventricular septal defect (VSD) were diagnosed in a 36-hour-old female camel. Physical examination revealed a firm protrusion of the dorsal aspect of the atlas and axis, tilting of the head to the left, and a grade V/VI systolic murmur. Neurological examination revealed proprioceptive deficits and ataxia of all 4 limbs. Radiographic examination and necropsy demonstrated malformation, fusion of the atlas to the occiput and hypoplasia of the dens of the axis, and subluxation of the atlantoaxial joint. Dorsoventral laxity of the atlantoaxial joint was also present, with compression of the cervical spinal cord. A 1.5-cm-diameter VSD was observed also. Histopathologic examination of the cervical spinal cord revealed a cavity extending from the level of the first to fourth cervical segment, dorsal to the central canal, 5 cm long and 1-2 mm in diameter. The cells around the cavity were positive for glial fibrillary acidic protein and sporadically positive for vimentin. This cavitary structure was consistent with syringomyelia, which was lined by glial cells, surrounded by oedematous white matter with Wallerian-like degeneration and with neuronal necrosis in the adjacent dorsal horns.
Descriptors: dromedary camels, hereditary defects, case reports, occipitoatlantoaxial malformation, ventricular septal defect, clinical aspects, diagnosis, genetic disorders, heart diseases, malformations, postmortem examinations, radiography, spinal diseases.

Schelling, E; Diguimbaye, C; Daoud, S; Nicolet, J; Zinsstag, J. **Seroprevalences des maladies zoonotiques chez les pasteurs nomades et leurs animaux dans le Chari-Baguirmi du Tchad.[Seroprevalences of zoonotic diseases in nomads and their livestock in Chari-Baguirmi, Chad.]** *Medecine Tropicale*. 2004; 64(5): 474-477. ISSN: 0025-682X. "Nomades

au Tchad: proceedings of a workshop held at N'Djamena, Chad, November 2002." Note: In French with an English summary.

Abstract: The seroprevalences of brucellosis and Q-fever were evaluated in humans and livestock in three Chadian nomadic communities, i.e., Fulani cattle breeders and Arab camel and cattle breeders. The survey was carried out in 1999 and 2000. The total number of human sera and animal sera tested were 911 and 1637, respectively, for antibodies against *Brucella* spp. and 368 and 613, respectively, for *Coxiella burnetii*. Sixteen brucellosis positive human sera resulted in a seroprevalence rate of 2%. Male participants were significantly more often brucellosis seropositive than females. No association was found between brucellosis serostatus and physical findings or reported symptoms. Positive brucellosis serology was more frequent in cattle (seroprevalence, 7%) than in camels (1.4%) and small ruminants (0.5%). Fifteen human sera from 11 Arab camel breeders and 4 Arab cattle breeders were positive for Q-fever (seroprevalence below 1%). Being a camel breeder was a significant risk factor for Q-fever seropositivity. Camels had the highest Q-fever seroprevalence (73%) among livestock species. Reproduced with permission of CAB.

Descriptors: nomadic people, humans, cattle, camels, ruminants, women, men, sex differences, antibodies, *Brucella,* brucellosis, epidemiology, Q fever,*Coxiella burnetii*, seroprevalence, zoonoses, abattoir fever, Balkan grippe, Derrick Burnet disease, Nine Mile fever, pneumorickettsiosis, quadrilateral fever, query fever. Tchad, zoonotic infections, Chad.

Shaheen, HM. **The effect of feed and water deprivation on ingestive behaviour and blood constituents in camels: comparison with sheep and goats.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 32-47. ISBN: 8190114123

Descriptors: dromedary camels, goats, sheep, species comparison study, feed and water deprivation, effects on ingestive behavior, blood chemistry, blood proteins, blood sugar, body temperature, body weight, dehydration, rehydration, drinking water, fasting, feed intake, feeding behavior, globulins, hematocrit, ion balance, nitrogen, osmotic pressure, potassium, serum albumin, sodium, urea.

Shaheen, HM. **Feeding and drinking of camels, sheep and goats after different periods of deprivation.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 13-26. ISBN: 8190114123

Descriptors: dromedary camels, sheep, goats, stressors, feed deprivation, fasting, water deprivation, rehydration, water intake, refeeding, adaptation, camel behavior, camel nutrition; behavior, blood chemistry, hematology, concentrates, drinking water, erythrocytes, feeding behavior, feeding preferences, roughage, species differences.

Straten, M van **Hypocalcaemia in two female camels (*Camelus dromedarius*): a case report.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 563-564. ISBN: 8190114123

Descriptors: female dromedary camels,blood chemistry, low calcium levels, hypocalcemia, case reports, clinical aspects, diagnosis, nutritional deficiency, therapy.

Tafti , AK ; Nourani, H. **The report of benign cystic teratoma (dermoid cyst) in camel ovaries (*Camelus dromedarius*).** *Iranian Journal of Veterinary Research.* 2004; 5(1(Ser.9)): 168-173. ISSN: 1728-1997. Note: In Arabic with an English summary.

Abstract: Dermoid cyst is a congenital developmental anomaly that is usually classified as benign cystic teratoma in which a single somatic cell layer predominates. Dermoid cyst mainly consists of the epidermis and its associated cutaneous adnexa and is located in abnormal sites. Here, we report the first case of dermoid cyst in a camel ovary. Macroscopically, the right ovary cortex contained a large spherical cyst filled with hairs and keratinized materials. The space was lined with keratinized, stratified squamous epithelium surrounded by connective tissue and hair follicles. Considering the unique histopathological features and abnormal location, the lesion was diagnosed as the first ovarian dermoid cyst. Reproduced with permission of CAB.

Descriptors: dromedary camels, dermoid cyst, benign cystic, birth defects, cancers, congenital malformations teratoma, case reports, congenital abnormalities, cysts pathological, diagnosis, histopathology, lesions, neoplasms, ovarian diseases, ovaries, Iran.

Tanwar, RK; Fakhruddin-; Anju Chahar. **Urethritis associated with sand masturbation in male camels.** *Intas Polivet*. 2004; 5(2): 279. ISSN: 0972-1738

Descriptors: dromedary camels, urethritis, sand masturbation, clinical signs, antibiotic therapy.

Tefera, M. **Observations on the clinical examination of the camel (*Camelus dromedarius)* in the field.** *Tropical Animal Health and Production.* 2004 July; 36(5): 435-449. Note: Includes references Summaries in French and Spanish.

DOI: http://dx.doi.org/10.1023/B:TROP.0000035006.37928.cf

Descriptors: dromedary camels; clinical examination; camel disease diagnosis; diagnostic techniques; restraint of animals: standing restraint, sternal recumbency, crush; body temperature fluctuations; morning high temperatures are fever; afternoon high temperatures maybe hyperthermia; pulse rate; heart rate 35-50 beats/minute; mean respiration 11/minute; discoloration of eye mucous membranes; left flank for rumen contractions 3+/1.2/5 min auscultation; palpable externally seen lymph nodes: parotid, maxillary, prescapular, inferior cervical, cubital, ilial, popiteal; diagnostic indicators for rapid diagnosis; ten endemic camel diseases; diurnal variations; rumen motility; Ethiopia.

Wernery, U; Ali, M; Kinne, J; Abraham, AA; Wernery, R. **Copper deficiency: a predisposing factor to septicaemia in dromedary calves.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 750-762. ISBN: 8190114123

Descriptors: dromedary camels, young camel calves, copper deficiency disease, blood poisoning, blood chemistry, *Clostridium perfringens*, *Escherichia coli*, clinical aspects, disease control, disease prevention, disease resistance, nutrient requirements, postmortem examinations, predisposition, risk factors, Arab countries.

Wernery, U; Kinne, J; Abraham, AA. **Treatment of copper deficiency in two dromedary calves.** In: TK Gahlot (Editor). *Selected Research on Camelid Physiology and Nutrition.* The Camelid Publishers, Bikaner, India. 2004; 763-765. ISBN: 8190114123

Descriptors: dromedary camels, copper deficiency disease, blood chemistry, clinical picture, case reports, diagnosis, disease control, mineral-supplements, Arab Countries.

Arabian: Viral Diseases

2008

Gur, S; (Guer?)Yapkic, O; Yilmaz, A. **Serological survey of bovine enterovirus type 1 in different mammalian species in Turkey.** *Zoonoses and Public Health.* 2008; 55(2): 106-111. ISSN: 1863-1959

Abstract: The bovine enterovirus type 1 (BEV-1) infection has a wide range of host spectrum including humans. In this study, seroprevalence of BEV-1 was investigated in eight mammalian species. Blood serum samples were collected from 244 humans, 1520 cattle, 272 horse, 126 dog, 281 sheep, 477 goat, 18 camel (*Camelus dromedarius*) and 82 gazelle (*Gazella subgutturosasubgutturosa*) in different regions of Turkey. Microneutralization tests showed that gazelle and camel did not have any seropositivities, but seropositivities were detected in humans (30.3%), cattle (64.8%), horse (12.8%), dog (3.2%), sheep (32.8%) and goat (27.6%).

Descriptors: dromedary camels, dogs, goats, horses, humans, sheep, gazelles, antibodies, bovine enterovirus 1, disease prevalence, disease surveys, disease transmission, epidemiology, seroconversion, serology, seroprevalence, zoonoses, disease surveillance, zoonotic infections, Turkey.

Hussein, MF; AlShaikh, M; El Rab, MOG; Aljumaah, RS; El Nabi, ARG; Bagi, AMA. **Serological prevalence of Q fever and chlamydiosis in camels in Saudi Arabia.** *Journal of Animal and Veterinary Advances*. 2008; 7(6): 685-688. ISSN: 1680-5593

Abstract: Tests for antibodies against *Coxiella burnetii* and *Chlamdophila abortus* were conducted in 460 and 186 Saudi camels, respectively, using an enzyme immunoassay technique. The serological prevalence of coxiellosis was 62% while that of chlamydiosis was 19.4%. Neither of these infections was associated with overt clinical disease in the camels and in both cases seropositivity was higher in adult than young camels. The prevalence of antibodies against *C. burnetii* was closely similar in male and female camels, while a much higher prevalence of anti-chlamydial antibodies was observed in female as compared to male camels. This is the first record of both infections among indigenous camels in Saudi Arabia. Reproduced with permission of CAB.

Descriptors: dromedary camels,epidemiology, Q fever, seroprevalence, sex differences, Chlamydiaceae, *Coxiella burnetii*, abattoir fever, Balkan grippe, *Chlamydophila abortus*, Derrick Burnet disease, Nine Mile fever, pneumorickettsiosis, quadrilateral fever, query fever, Saudi Arabia.

Shiilegdamba, Enkhtuvshin; Carpenter, Tim E; Perez, Andrcbs M; Thurmond, Mark C. **Temporal-spatial epidemiology of foot-and-mouth disease outbreaks in Mongolia, 2000 - 2002.** *Veterinary Research Communications*. 2008 Mar; 32(3): 201-207. ISSN: 0165-7380

DOI: http://dx.doi.org/10.1007/s11259-007-9018-6

NAL: call no: SF601.V38

Abstract: Prior to 2000, foot-and-mouth disease (FMD) had not been observed in Mongolia since 1973; however, between April 2000 and July 2002, Mongolia reported 44 FMD outbreaks that affected cattle, sheep, goats, and camels. The objectives of this study were to describe the distributions of the 44 reported FMD outbreaks in Mongolia and to assess their spatial clustering and directions of movement. Official reports were collected to obtain the number and species of animals both affected and at risk, and the date and geographical coordinates of each outbreak. Significant global and local spatial clusters of reported FMD outbreaks were identified. Disease spread during the second epidemic moved 76p northeast and the spread of the disease during the third epidemic moved 110p northwest. FMD outbreaks were clustered intensely close to other FMD-positive counties. These findings can be used in the future to help plan prevention and control measures in high risk areas.
Descriptors: animal diseases, camels, cattle diseases, sheep diseases, goat diseases, foot and mouth disease, FMD virus, emerging diseases, disease outbreaks, disease prevalence, disease incidence, temporal variation, geographical variation, disease distribution, risk assessment, epidemiological studies, data collection, statistical analysis, Mongolia.

Wernery, U; Knowles, NJ; Hamblin, C; Wernery, R; Joseph, S; Kinne, J; Nagy, P. **Abortions in dromedaries (*Camelus dromedarius*) caused by equine rhinitis A virus.** *Journal of General Virology*. 2008 Mar; 89(3): 660-666. ISSN: 0022-1317
URL: http://jgv.sgmjournals.org/
NAL call no: QR360.A1J6.
Abstract: A virus was isolated from aborted dromedary (*Camelus dromedarius*) fetuses during an abortion storm in Dubai, United Arab Emirates. Laboratory investigations showed the causative agent to be indistinguishable from equine rhinitis A virus (ERAV), a picornavirus. Two pregnant dromedaries experimentally infected with the camel virus isolate both aborted and an identical virus was reisolated from both fetuses, thus confirming the diagnosis. The extremely high prevalence of antibody (>90 %) and the high titres recorded against ERAV in the dromedary herd clearly showed that ERAV does infect dromedaries. Unlike horses, where ERAV targets the upper respiratory tract, in dromedaries the target organ appears to be the genital tract.
Descriptors: dromedary camels, aborted fetuses, viral diseases of animals and humans, viral infection, equine rhinitis A virus, United Arab Emirates.

Wilson, RT. **Perceptions and problems of disease in the one-humped camel in southern Africa in the late 19th and early 20th centuries.** *Journal of the South African Veterinary Association.* 2008; 79(2): 58-61. ISSN: 0038-2809
Descriptors: dromedary camels, introduction into Namibia for military purposes, camels introduced into South Africa and Rhodesia (Zimbabwe) to replace oxen, concerns regarding introductions of disease, foot and mouth disease, mange, trypanosomosis, antibodies to common lifestock found in later years.

2007

Abubakr, MI; Gould, EA; Moss, S; Abdelrahman, AO; Fadlallah, ME; Nayel, MN; Adam, AS. **An outbreak of contagious ecthyma in the Kingdom of Bahrain.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 42-43.
Abstract: Contagious ecthyma (contagious pustular dermatitis, orf) is a highly infectious viral skin disease of sheep and goats caused by a parapoxvirus. The disease is characterized by the development of pustular and scabby lesions on the muzzle and lips. Severe facial oedema has been reported in lambs. Although contagious ecthyma has been known in sheep and goats since 1913, its description in camels has been relatively recent. The disease is then recorded in Kazakhstan. Somalia, Mongolia, Kenya, Sudan and Saudi Arabia. This paper reported on an outbreak of contagious ecthyma in camels (n=150) from Bahrain. The affected animals showed severe papules and pustules on the lips, muzzles and eyelids, increase in body temperature, profuse salivation, foul mouth smell and facial oedema. The morbidity rate was 100%, but no mortality was recorded. The infected camels were given supportive treatment. Their mouths were washed with antiseptic solution, and Penstrep was administered at a dose of 20 ml for 7 days. An antihistaminic (Histamil) was also administered at a dose of 8 ml for 3 days. Most of the camels recovered within 2 weeks, whereas the more severely affected animals recovered within one month. The PCR results implied that the contagious ecthyma in camels could have been caused by a pseudo cowpox-related virus rather an orf virus. Reproduced with permission of CAB.
Descriptors: dromedary camels, antibiotics, antihistaminics, antiseptics, clinical aspects, diagnosis, disease control, DNA, drug therapy, edema, outbreaks, PCR, skin lesions, contagious ecthyma virus, cowpox virus, antihistamines, chemotherapy, clinical picture, contagious pustular dermatitis, CPD virus, deoxyribonucleic-acid, orf virus PCR, scabby mouth, sore mouth, ulcerative dermatosis, Bahrain.

Ahmed, SM; Hegde, BP. **Preliminary study on the major important camel calf diseases and other factors causing calf mortality in the Somali Regional state of Ethiopia.** In: Gahlot, TK (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 31-41.
Abstract: This study was undertaken in 5 randomly selected districts of Aider zone. 15 households were selected from each district. A total of 75 households were included in this study. Random sampling technique was used. Calf mortality was seen as prenatal death due to abortion, postnatal death from first week to 3 months of calf age and before weaning period. The latter was mainly caused by some endemic diseases and other associated factors. In this study, the abortion rate was 16% and was caused by several factors. These included accidental death of fetus and trypanosomiasis, which contributed 64.3 and 28.6%, respectively, in the case of Jarati, whereas trypanosomiasis and stress conditions contributed 40 and 46.7%, respectively, in the case of Hargelle. On the other hand, stress conditions caused by adverse environmental conditions and unidentified poisonous plants contributed 26.7 and 73.3%, respectively, in the case of Barey. Similarly, trypanosomiasis, accidental death and stress conditions and browsing of poisonous plants contributed 33.3, 40.0, 20.0 and 6.7%, respectively, in the case of Dollo-Bay. With regard to El-kari district, about 66.7, 26.7 and

6.7% of respondents claimed that abortion was caused by accidental deaths, poisonous plants and stressful conditions, respectively. On the other hand, calf death was very high during the first week after birth. About 60, 50, 55, 45, 35% of Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggested that an average 51% of calf losses were encountered during the first week of calves. Calf mortality of about 30% was encountered during the first 90 days of calf age, whereas the remaining 19% were encountered after 90 days of calf life before weaning. Poor colostrum feeding practice was also believed to be one of the major causes of calf mortality during the first week of life. Furthermore, some endemic diseases and other associated factors were also reported to be among the major causes of calf mortality during the lactation period before weaning. The most important disease found was calf scour (daab). The morbidity and mortality rates of calf scour were 87 and 39%, respectively. Sunken eye (ilqod) was considered as the second problematic disease of calves by herders. The disease caused serious economic losses to the households through loss of milk after death of the calves. The morbidity and mortality rates due to sunken eyes were 57 and 12%, respectively. Contagious ecthyma (canbaruur) was considered as one of the important diseases of calves by herders. The morbidity and mortality rates of contagious ecthyma were 75 and 6.9%, respectively. Contagious necrotic skin was also considered as one of the important diseases of calves by herders. About 88% of all districts reported that the disease affected their calves with morbidity and mortality rates of 35 and 4.6%, respectively. Other endemic diseases reported were trypanosomiasis with morbidity and mortality rates of 9.6 and 6.7%. Camel pox had morbidity and mortality rates of 42 and 7%, respectively. Pneumonia had a mortality rate of 7%. On the other hand, factors causing calf losses included predation which was about 4.8, 23.8, 26.6, 16.7, and 26.2% in Hargelle, Jarati, Barey, Dollo-Bay and El-kari, respectively, suggesting that predators were considered next to diseases in causing calf mortality. Reproduced with permission of CAB.

Descriptors: dromedarycamels, calves, fetal abortion, age differences, animal diseases, anthrax, camel milk, colostrum, deformities, diarrhea, losses *scarcoptes* mange, morbidity, mortalitynecrosis, pneumonia, poisoning, poisonous plants, predation, stress, toxicity, trypanosomiasis, viral diseases, *Bacillus anthracis*, contagious ecthyma virus, plants, *Trypanosoma*, contagious pustular dermatitis, CPD virus, death rate, diarrhea, orf virus, scabby mouth, sore mouth, toxic plants, toxicosis, trypanosomosis, ulcerative dermatosis, viral infections, Abyssinia, Ethiopia.

Al Afaleq, AI; Abu Elzein, EME; Hegazy, AA; Al Naeem, A. **Serosurveillance of camels (*Camelus dromedarius*) to detect antibodies against viral diseases in Saudi Arabia.** *Journal of Camel Practice and Research.* 2007; 14(2): 91-96. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A serological survey was conducted to detect antibodies in dromedary camels against viral diseases of veterinary importance in Saudi Arabia. The goal of this study was to examine the extent of exposure of the camel to such diseases, reflected by positive or negative seroconversion. The overall results indicated that out of 2,472 examined sera samples, 10.6% had antibodies against the viruses investigated in the present study. The incidence of infection was 20% for rinderpest, 18% for bovine viral diarrhoea, 13% for infectious bovine rhinotracheitis, 1.5% for bluetongue, and 0.2% for Rift Valley fever. Reproduced with per-

mission of CAB.
Descriptors: dromedary camels, exposure to viral diseases, epidemiology, Rift Valley fever virus, rinderpest virus, bluetongue virus, bovine herpesvirus 1, bovine viral diarrhea virus 1, cattle plague, Saudi Arabia.

Al Dubaib, MA. **Rabies in camels at Qassim region of Central Saudi Arabia.** *Journal of Camel Practice and Research.* 2007; 14(2): 101-103. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A questionnaire survey on the incidence of rabies in camels, targeting camel herdsmen, was carried out to investigate the incidence of the disease in the central region of Saudi Arabia. Forty eight camel herdsmen looking after 4124 camels were included in the survey. The questionnaire included incidence of the disease, type of animals transmitting the disease, clinical signs and whether rabid camels are source of infection to humans. The incidence of the disease was found to be about 0.2%. The disease was transmitted in about 70% of cases by bites from rabid wild dogs and in 17% of cases from bites of rabid foxes. The source of infection was not found in about 13% of cases. Camels were bitten when they defend their offspring from attacking predators. The usual sites of the bite were either on fore or hind limbs. The disease was mainly of the silent or dumb type (67% of cases). The male camel was especially dangerous when showing the furious form of the disease, attacking and biting nearby objects and mutilating its own body. The clinical signs of the disease were restlessness, salivation and rotation of head and neck in all directions. These signs were soon followed by paralysis, recumbency and death. Results also showed that camels did not transmit rabies to humans. Reporting of rabies in camels in Qassim region is poor since camel owners are nomads which travel far and inaccessible distances in the desert. They are also not keen to report the disease to the veterinary authorities. A rabid camel is usually separated from the herd and left to die in the desert, or destroyed when aggressive. During 2002-2006, three heads of suspected rabid camels were examined histopathologically for the presence of viral inclusions (Negri bodies). There was no encephalitis and the viral inclusions were found in the midbrain nerves cell bodies. The number of viral inclusions varied from one to four and stained faintly acidophilic with haematoxylin and eosin. Reproduced with permission of CAB.
Descriptors: dromedary camels, dogs, wild foxes, animal bites, rabies virus, animal disease vectors, clinical aspects, diagnosis, disease prevalence, disease surveys, disease transmission, wild foxes as disease reservoir, zoonotic diseases, epidemiological surveys, epidemiology, histopathology. Saudi Arabia.

Al Hizab, FA; Abdelsalam, EB. **Non-suppurative meningoencephalitis in dromedary camels in Saudi Arabia.** *Journal of Camel Practice and Research.* 2007; 14(2): 105-108. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: Histological evidence of a non-suppurative meningoencephalitis was detected in 5 adult camels (*Camelus dromedarius*), brought for postmortem examination with a clinical history of nervous signs. The inflammatory reaction was dominated by intense lymphocytic infiltration and perivascular cuffing, microgliosis, and degeneration and necrosis of some individual neurons in the cerebral and cerebellar cortex. Severe vascular changes characterised

by diffuse capillary congestion and focal haemorrhages in the white matter were frequently observed. Leptomeningitis was further indicated by fibrinous exudation and inflammatory cellular infiltration of lymphocytes, macrophages and glial cells. The causative agent was not yet determined. However, the purely lymphocytic nature of the inflammatory reaction is highly suggestive of viral infection. Reproduced with permission of CAB.
Descriptors: dromedary camels,brain, cerebrum, brain diseases, viral diseases, clinical aspects, disease prevalence, epidemiology, histopathology, meningoencephalitis, pathogenesis, pathology, etiology, viral diseases, Saudi Arabia.

Al Zi'abi, O; Nishikawa, H; Meyer, H. **The first outbreak of camelpox in Syria.** *Journal of Veterinary Medical Science.* 2007; 69(5): 541-543. ISSN: 0916-7250
DOI: http://dx.doi.org/10.1292/jvms.69.541
Abstract: In this study we report the first outbreak of camelpox in two provinces in Syria. Clinical symptoms started with fever, salivation and general exanthema. The main features were facial and legs oedema, pustules on the mucosa of the lips and a high rate of abortion. Lesions may also occur on the whole body including scrotum and udder. Specimens were investigated by electron microscopy, virus isolation in cell culture and embryonated eggs and by immunohistochemistry. The causative agent was identified as camelpox virus by polymerase chain reaction and sequencing of the hemagglutinin gene.
Descriptors: dromedary camels, camelpox virus, clinical aspects, epidemiology, lesions, pathology, camel viral disease outbreaks, clinical picture; viral infections, Syria.

Al Ziabi, O. **Application of immunohistochemistry to detect camelpox virus in cell culture and histological sections.** *Assiut Veterinary Medical Journal.* 2007; 53(112): 209-222. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: During the spring and summer of 2005, an outbreak of camelpox was reported in the province of Hama and Duma city, Egypt. Therefore, this study was designed to detect camelpox virus in Vero cell culture and paraffin tissue section by immunohistochemistry. Skin samples (pustules, vesicles and scabs) from infected camels were collected from Duma and Hama. Monoclonal antibody (mouse anti-camelpox IgG) and labelled secondary antibody (rabbit anti-mouse IgG HRP) were used to demonstrate camelpox virus. Camelpox virus was localized in the cytopathic effects in cell culture (syncytia and round cells) and inclusion bodies in the dermal and epidermal cell of the skin. The present study shows that immunohistochemistry is a sensitive diagnostic technique for camelpox using skin samples, with a sensitivity of 98%. Reproduced with permission of CAB.
Descriptors: dromedary camels, camelpox, camelpox virus, skin tissue sampling, cell culture, diagnosis, diagnostic techniques, immunohistochemistry, Egypt.

Ali, YH; Khalafalla, AI; Gaffar, ME; Peenze, I; Steele AD. **Molecular epidemiology and characterization of camel group A rotaviruses in Sudan**. In: E Camus; E. Cardinale; C Dalibard; D Marinez; JF Renard; F Roger. *Proceedings of the 12 th International Conference of the Association of Institutions for Tropical Veterinary Medicine AITVM, Montpellier, France, 20-22 August, 2007 Does Control of Animal Infectious Risks Offer a New International Perspective?*Published by CIRAD. 2007; 119. ISBN: 9782876146501. Note: A conference paper.
Descriptors: calves cattle, camels, dromedaries, rotavirus diseases, characterization, scouring,

diarrhea, disease prevalence, disease surveys, epidemiology, molecular epidemiology, RNA, electropherotype, Sudan.

Dedet, JP. **Les decouvertes d'Edmond SERGENT sur la transmission vectorielle des agents de certaines maladies infectieuses humaines et animales. [Edmond Sergent's discoveries on the vectorial transmission of agents of human and animal infectious diseases.]** *Bulletin de la Societe de Pathologie Exotique.* 2007; 100(2): 147-150. ISSN: 0037-9085. Note: In French with an English summary.
URL: http://www.pathexo.fr
Abstract: Edmond Sergent has been head of the Institut Pasteur in Algeria during 1910-63, and during those years, carried out an impressive scientific research and studied a lot of agents responsible for human, animal and plant diseases. In the field of vectorial transmission of infectious diseases, he made two essential discoveries: the transmission of cosmopolitan relapsing fever by human body louse in 1908, a year before Charles Nicolle discovered the transmission of the classical exanthematic typhus by the same insect, and the transmission of cutaneous leishmaniasis by the phlebotomine sandfly. Moreover, he made other discoveries in similar fields, such as the transmission of dromedary trypanosomiasis by Tabanids, and later by *Stomoxys calcitrans*, and the transmission of the pigeon *Haemoproteus* by *Lynchia maura*. Finally, he described the transmission of *Theileria dispar* (now *T. annulata*) by the tick *Hyalomma mauritanicum* (1928). Reproduced with permission of CAB.
Descriptors: Edmond Sergent, Insitut Pasteur, early researcher, animal and human diseases, medical entomologist, veterinary entomology, disease transmission, disease vectors, vector borne diseases, cutaneous leishmaniasis, louse borne typhus, protozoal infections, trypanosomiasis, dromedary camels, pigeons, *Haemoproteus*, *Hyalomma*, *Leishmania,* Phlebotominae, *Pseudolynchia canariensis*, *Rickettsia prowazekii*, *Stomoxys calcitrans,* Tabanidae, *Theileria annulata*, *Trypanosoma*, *Hyalomma mauritanicum*, *Lynchia maura*.

Housawi, FMT. **Screening of domestic ruminants sera for the presence of anti-camel pox virus neutralizing antibodies at Al-Hassa District of Saudi Arabia.** *Assiut Veterinary Medical Journal.* 2007; 53(115): 101-105. ISSN: 1012-5973. In English with an Arabic summary.
Abstract: This study was conducted to determine the possible presence of anti-camel pox neutralizing antibodies in other domestic ruminants. 350 serum samples were collected from domestic ruminants (200 camels, 50 cattle and 50 sheep and goats). Microserum neutralization test (SNT) revealed the presence of neutralizing anti-camel pox antibodies in ruminants from the Al-Hassa district. Of the total serum samples tested, 33 were found to be positive (9.14%). When the serum samples were grouped according to their species and type of management, the prevalence rates were found to be 21 and 4.0% in nomadic and abattoir camels, respectively. Seroconversion in these camels was due to previous exposure to camel pox virus. Sheep and goats showed 6.0 and 10% prevalence rates, respectively. The prevalence rate in cattle was 0%.
Descriptors: dromedary camels, cattle, goats, sheep, orthopox virus, blood-serum, disease prevalence, disease surveys, epidemiological surveys, epidemiology, immune response, neutralizing antibodies, serological surveys, seroprevalence, disease surveillance, immunity reactions, immunological reactions, sero-epidemiology, Saudi Arabia.

Khalafalla, AI; Ali, YH. **Observations on risk factors associated with some camel viral diseases.** In: E Camus; E Cardinale; C Dalibard; D Marinez; JF Renard; F Roger. *Proceedings of the 12 th International Conference of the Association of Institutions for Tropical Veterinary Medicine AITVM, Montpellier, France, 20-22 August, 2007 Does Control of Animal Infectious Risks Offer a New International Perspective?* Published by CIRAD. 2007; 101-105. ISBN: 9782876146501. Note: A conference paper.

Abstract: Four diseases of camels are of increasing economic significance. These are camel pox (CP), camel contagious ecthyma (CCE), rota viral diarrhea (RVD) and Morbillivirus infection (MVI). CP occurred in epizootics that lasted for 2-5 months with higher prevalence in winter. It mostly affected young animals of less than 5 years old. Group watering and introduction of new animal to a susceptible herd are the main risk factors. CCE is endemic in Sudan with variations in severity and mortality depending on age and geographical location. The major risk factors for CCE are season of the year, camel age and location associated with abundance of thorny acacia trees. MVI is an emerging viral disease that recently caused heavy losses in eastern Sudan. Mortality rate ranged between 0 to 50% and vary in accordance with location with a mean of 7.4%. More than 80% of deaths were in pregnant and recently delivered she-camels. Group A rotavirus was detected in 20% of diarrheic camels in Sudan The main age group affected was 0-3 months. Higher prevalence of rotavirus infection was noticed during wet season than dry and winter seasons. Risk factors for these viral diseases contributing to disease transmission in free ranging camels are identified and discussed. Reproduced with permission of CAB.

Descriptors: dromedary camels, contagious pustular dermatitis, camel pox (CP), camel contagious ecthyma (CCE), rota viral diarrhea (RVD), Morbillivirus infection (MVI), CPD virus, scabby mouth, sore mouth, ulcerative dermatosis, viral infections, age, disease prevalence, disease transmission, risk factors, seasons, death rate, mortality, orf, thorny Acacia, Morbillivirus, Poxviridae, Rotavirus, Sudan.

Patel, AR; Chauhan, HC; Chandel, B S; Dadawala, AI; Patel, NP; Smital-Patel; Agrawal, SM; Kher, HN. **Seroprevalence of bluetongue virus antibodies in camels in organised farms of Gujarat.** *Journal of Camel Practice and Research*. 2007; 14(2): 97-100. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com

Abstract: A total of 82 camels' sera were screened for the presence of BTV group specific antibodies. The overall rate of seroprevalence was 25.61, 28.05 and 37.80 per cent by BT-AGID, CCIE and c-ELISA, respectively. Camels of two organised farms viz., Camel Breeding Farm, Dhori (Kuchchh) and Camel Farm, Jampura were screened for BTV group specific antibodies and the rate of seroprevalence was 24.07, 25.93, and 37.04 per cent in Dhori and 28.57, 32.14 and 39.26 per cent in Jampura. The higher rate of seroprevalence was reported in camels having dermatitis (30, 30 and 45 per cent) and stiffness (35.14, 42.86 and 50 per cent) than in the apparently healthy camels (20.83, 22.92 and 31.25 per cent) by BT-AGID, CCIE and c-ELISA, respectively. Reproduced with permission of CAB.

Descriptors: dromedary camels, Bluetongue virus, antibodies, dermatitis, ELISA, counter-immunoelectrophoresis, diagnosis, disease prevalence, disease surveys, immunodiagnosis, immunodiffusion, serological surveys; seroprevalence, Gujarat, India.

Wernery, U; Thomas, R; Syriac, G; Raghavan, R; Kletzka, S. **Seroepidemiological studies for the detection of antibodies against nine infectious diseases in dairy dromedaries (Part - I).** *Journal of Camel Practice and Research*. 2007; 14(2): 85-90. ISSN: 0971-6777
URL: http://www.camelsandcamelids.com
Abstract: A total of 1119 dromedary sera (from 541 dams and 578 calves) in Dubai were tested for 9 different infectious diseases using commercially available ELISAs or other tests [date not given]. No antibodies were detected against foot and mouth disease (FMD), rinderpest (RP) and Peste des petits ruminants virus (PPR), but antibodies were found for West Nile Fever (WNF), tuberculosis (Tb), brucellosis, anaplasmosis (AP), trypanosomiasis (Tryp) and toxoplasmosis (TG). Reproduced with permission of CAB.
Descriptors: dromedary camels, *Anaplasma*, foot and mouth disease virus, *Mycobacterium bovis*, Peste des petits ruminants virus, Rinderpest virus, *Toxoplasma*, *Trypanosoma*, West Nile virus,agglutination tests, animal diseases, antibodies, antibody testing, antibody detection, diagnosis, diagnostic techniques, disease prevalence, disease surveys, ELISA, epidemiological surveys, epidemiology, immunodiagnosis, infectious diseases, serological surveys, seroprevalence, Dubai.

Wernery, U. **Dromedaries have a low susceptibility to foot-and-mouth disease - results of 3 infection trials.** In: TK Gahlot (Editor). *Proceedings of the International Camel Conference "Recent Trends in Camelids Research and Future Strategies for Saving Camels", Rajasthan, India, 16-17 February 2007*. 2007; 19-22.
Abstract: Scientists from CVRL in Dubai and Lindholm, Denmark carried out 3 infection trials with FMD virus serotypes O and A in dromedaries at CVRL. High doses of FMD virus were inoculated subepidermolingually into 15 dromedaries. Several dromedaries and sheep were kept in the same pen as the inoculated camels as continuous direct contacts. Modern laboratory techniques like virus isolation, RT-PCR, ELISA and VNT were used to diagnose an infection. All inoculated and in contact animals were regularly sampled including probang sampling. None of the inoculated dromedaries or contact animals showed any clinical signs of FMD. Only 1 dromedary had a raised body temperature 3 days after inoculation with FMDV O and developed a viraemia on day 2 to 4 after inoculation determined by virus isolation from serum samples, but no infectious virus was detected from the probang samples. This dromedary was also seroconverted. None of the other infected camels and none of the contact animals developed antibodies to FMDV. Based on these results, we conclude that dromedaries are of very low susceptibility to infection with FMDV and do not transmit infection to other susceptible animals even by close direct contact. Therefore, dromedaries do not play any significant role in the natural epidemiology of FMD.
Descriptors: dromedary camels, sheep, antibodies, ELISA, experimental infections, FMD, foot and mouth disease, neutralization tests, reverse transcriptase PCR, seroconversion, susceptibility, viremia, Denmark, Dubai.

2006

Abdo Salem, S; Gerbier, G; Bonnet, P; Al Qadasi, M; Tran, A; Thiry E; Al Eryni, G; Roger, F.
Descriptive and Spatial Epidemiology of Rift Valley Fever Outbreak in Yemen 2000–2001. *Annals of the New York Academy of Sciences.* 2006; 1081: 240-242. ISSN: 0077-8923.
Note: "Impact of Emerging Zoonotic Diseases and Animal Health: 8th Biennial Conference of the Society for Tropical Veterinary Medicine, Hanoi, Vietnam, 26 June-1 July 2005."
DOI: http://dx.doi.org/10.1196/annals.1373.028
Abstract: This paper presents a retrospective summary of data on Rift valley fever cases among animals (cattle, sheep, goats and camels) in Yemen, during 23 September 2000-3 February 2001. Data from several RVF surveys were gathered from the Yemeni veterinary services and FAO experts. Geographical data (topographic maps and data available on the internet) were used for the location of outbreaks. After cleaning and standardization of location names, all data were introduced into a GIS database. The spatial distribution of outbreaks was studied at the national level and at a local scale, particularly in Wadi Mawr in the Tihama plain, western coast of Yemen. Of the 612 villages, 67 were infected with RVF. Most of these villages were located around the irrigation canal. A first interpretation of a vegetation index derived from satellite imagery showed a spatial heterogeneity in locations with cases. It is suggested that passive surveillance should be continued and the quality of data should be improved. In addition, landscape studies and entomology surveys in the area should be performed.
Descriptors: dromedary camels, cattle, goats, sheep, humans, disease distribution, epidemiology, outbreaks, Rift Valley fever, spatial distribution, Rift Valley fever virus, RVF, 2001 outbreak in Yemen, description and spatial epidemiology, summary of data, Yemeni vet services, FAO experts, mapping locations for spatial distribution.

Agab, H. **Diseases and causes of mortality in a camel (*Camelus dromedarius*) dairy farm in Saudi Arabia.** *Journal of Camel Practice and Research.* 2006; 13(2): 165-169. ISSN: 0971-6777
URL: www.camelsandcamelids.com
Abstract: The diseases and causes of mortality in intensively kept dromedary camels reported in this study were studied throughout one year (July 2001-June 2002) in a dairy camel farm in Al-Qassim region, central Saudi Arabia. The camel population in the farm at the study period was composed of 2316 adult and weaned calves and 126 suckling calves. 942 camels were affected with one or more disease conditions, giving a crude morbidity rate of 38.6%. The ten most common diseases encountered among the camels of the farm were mange (22.6%), mastitis (20.9%), camel dermatophilosis (18.7%), Heyam syndrome (trypanosomiasis like sings) (14.5%), skin wounds and abscesses (4.2%), calf diarrhoea (4.1%), diazinon toxicity (3.5%), snake bites (1.9%), respiratory complaints (1.8%) and papillomavirus infection (1.7%). Other diseases encountered included eye affections (1.2%), metritis (1%), uterine prolapse (1%), retained placenta (0.7%), bone fractures (0.6%), urea intoxication (0.5%), abortions (0.5%) and dystocia (0.4%). During the period of study, 180 camels died, giving a crude mortality rate of 7.4%. The most common causes of mortality recorded in the camel farm were due to Heyam syndrome (53.3%), diazinon toxicity (15%), snake bites (10%), calf diarrhoea (8.9%), undiagnosed cases (5%), bone fractures (3.3%), urea intoxication (2.8%), uterine prolapse (1.1%) and dystocia (0.6%).

Descriptors: dromedary camels, abortion, camel diseases, *Dermatophilus*, papillomavirus, *Trypanosoma,* disease prevalence, disease surveys, epidemiological surveys, epidemiology, abscesses, etiology, bone fractures; causes of death, diarrhea, dystocia, endometritis, uterine prolapse, placental retention, eye diseases, mastitis, respiratory diseases, skin diseases, snake bites, milk production, morbidity, mortality, poisoning, diazinon, toxicity, wounds, Saudi Arabia.

Baky, MHA; Al Sukayran, AM; Mazloum, KS; Al Bokmy, AM; Al Mujalli, DM. **Isolation and standardization of camel pox virus from naturally infected cases in the central region of Saudi Arabia 2004.** *Assiut Veterinary Medical Journal.* 2006; 52(108): 183-193. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: Camel pox virus in skin scrapings collected from camels severely affected with camel pox was detected using indirect fluorescent antibody (IFA) test using standard anti-Jouf-78 strain camel pox virus rabbit antiserum. The causative agent was isolated and purified through five successive passages on vero cell cultures using the highest positive dilutions. The virus isolate showed identical cytopathogenic effects (CPE) in inoculated vero cell cultures between the first and fifth passages. The isolate was standardized as a virulent camel pox virus by application of IFA, virus neutralization and pathogenicity tests and designated as Saudi Arabia, Uniza 2004 strain. Reproduced with permission of CAB.

Descriptors: dromedary camels, camel pox, camel pox virus, diagnosis, diagnostic techniques, immunofluorescence, fluorescent antibody technique, IFAT isolation, camel viral diseases, Saudi Arabia.

El Hakim, UA. **The role of camels in dessimination of peste des petits ruminants virus among sheep and goats in Saudi Arabia.** *Assiut Veterinary Medical Journal.* 2006; 52(110): 132-145. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: This study was conducted to investigate the peste des petits ruminants (PPR) in camels and to determine the role played by camels in the transmission of the PPR virus. 50 camels as well as 50 goats and 50 sheep in contact with the camels were used in this study. The animals belonged to a private animal farm in the Kingdom of Saudi Arabia. These animals were examined clinically and virologically (virus isolation, VI) and by a molecular biology-based technique (reverse transcription-polymerase chain reaction, RT-PCR). All animals were clinically healthy at the beginning of the study. Clinical examination was done 3 times a week, whereas VI and RT-PCR were performed twice at one-month interval. Clinical examination showed that 4 camels had fever, nasal discharge and cough, whereas 21 goats suffered from fever, stomatitis, nasal and ocular discharges, diarrhoea and pneumonia after 2 weeks of contact with infected camels. In the first viral isolation, PPR virus was found to be present in 6 camels, but no PPR virus was detected in the examined goats and sheep. After performing the first RT-PCR, PPR viral nucleic acid was identified in 10 camels, but all examined goats and sheep were negative for this technique. PPR virus was isolated from 11 camels and 32 goats, whereas all examined sheep were negative in the second viral isolation. The second RT-PCR showed presence of PPR viral nucleic acid in 17 camels and 35 goats, whereas no PPR viral nucleic acid could be detected in all examined sheep. The results

proved that camel was susceptible to PPR, and infected camels could transmit PPR virus to other camels. Moreover, camels played a very important role in dissemination of PPR virus to contact goats. The risk posed by this role in dissemination of PPR virus was increased by the fact that most infected camels were apparently healthy. This role was not proven in sheep examined in this study. The results also showed that RT-PCR was faster and more sensitive than VI in the diagnosis of PPR, thus the use of the former in routine diagnosis of PPR and in any epidemiological studies concerning PPR and examination of camels imported from Sudan was recommended to control and eradicate this disease from Egypt. Reproduced with permission of CAB.
Descriptors: dromedary camels, goats, sheep, peste des petits ruminants virus, PPR virus, clinical aspects, diagnosis, diagnostic techniques, disease transmission, PCR, polymerase chain reaction, Saudi Arabia.

Hunter, A (Editor). ***La Sante Animale. Volume 2. Principales Maladies. [Animal Health. Volume 2. Principal Diseases.]*** Published by Editions Quae, Versailles. 2006; 310 pp. ISBN: 2759200051; 9782759200054. Note: In French.
Abstract: The first volume of this work considered the fundamentals of animal pathology and the principles of disease control; volume 2 considers the most important diseases of livestock in the tropics and subtropics in more detail. Each disease is described with reference to its symptoms, aetiology, mode of transmission, treatment and prevention. The first part covers infectious and contagious diseases (viral and bacterial diseases, coccidiosis and dermatomycoses) of livestock in general, bovines, small ruminants, camels, equines and pigs. Part 2 covers venereal and congenital infections; part 3 describes arthropod parasites (flies, lice, fleas, ticks and mange mites). Vector-borne diseases of livestock in general, small ruminants and equines are considered in part 4, helminths and helminthoses in part 5, and environmental and other diseases (metabolic disorders, neoplasms, nutritional deficiency and poisoning) in part 6. This book is intended for use by veterinary technicians and agricultural advisors, and as a textbook in higher education. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, goats, horses, pigs, sheep, pigs, livestock animal diseases, bacterial diseases, clinical aspects, coccidiosis, deficiency diseases, animal disease transmission, drug therapy, ectoparasites, helminthes, infectious diseases, metabolic disorders, poisoning, prophylaxis, tropics, vector borne diseases, viral diseases, bacterial infections, bacterioses, chemotherapy, clinical picture, communicable diseases, parasitic worms, toxicosis, tropical countries, viral infections.

Kouba, V. **Double-barrier strategy against foot-and-mouth disease panzootic wave successfully applied under Mongolian conditions.** *Agricultura Tropica et Subtropica.* 2006; 39(1): 21-25. ISSN: 0231-5742
URL: http://www.itsz.czu.cz
Abstract: This paper presents the double-barrier strategy used by the veterinarians from Czechoslovakia to control the foot and mouth disease panzootic wave under desert and steppe conditions in Mongolia in March 1964. The concept consists of complex protection of FMD-free territories mainly through vaccination of susceptible animals and creation of wide protective zones. Immediate and uncompromising isolation of infected territories and outbreak areas, consistent complex intrafocal measures, rigorous epizootiological surveillance,

immediate diagnosis of suspected cases, prevention of threatened territories and mass vaccination in threatened zones have been parts also of the strategy. The FMD panzootic wave has been stopped and gradually liquidated by combining classical anti-FMD protection and intrafocal measures replacing aphtization by vaccination. The full feasibility and biological and economic efficiency of the double-barrier anti-FMD strategy has been proven. It is proven as a suitable system for controlling and stopping the FMD panzootic wave in the future in any other territory with similar epizootiological and ecological conditions as that of Mongolia. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, sheep, goats, pigs, FMD, foot and mouth disease, disease surveillance, disease surveys, outbreaks, diagnosis, disease control, disease prevention, vaccines, vaccination, mmunization, grasslands, arid lands, deserts, steppes, Czechoslovakia, Mongolia.

Mahdavi, S; Khedmati, K; Sabet, LP. **Serologic evidence of bluetongue infection in one-humped camels (*Camelus dromedarius*) in Kerman province, Iran.** *Iranian Journal of Veterinary Research.* 2006; 7(3(Ser.16)): 85-87. ISSN: 1728-1997. Note: In English with a Persian summary.
URL: http://www.shirazu.ac.ir/en/index.php?page_id=60
Abstract: This is the first report on the presence of bluetongue (BT) disease in 10 pregnant camels from a herd in Kerman province, Iran. All serum samples were tested serologically using AGID and competitive ELISA. Razi-BK cell line, primary culture of ovine kidney and embryonated chicken eggs (ECE) were also used to culture and isolate the BT virus. Efforts to culture and isolate BT virus have attained very limited success. Following precipitation test (AGID) and C-ELISA, 5 of the 10 sera in AGID test, and all in C-ELISA became positive. Further studies are needed on the ecology of camels and vector midges to clarify the reason for the infection of these camels in Iran.
Descriptors: dromedary camels, case reports, Bluetongue virus, clinical aspects, diagnosis, diagnostic techniques, Iran.

Marodam, V; Nagendrakumar, SB; Tanwar, VK; Thiagarajan, D; Reddy, GS; Tanwar, RK; Srinivasan, VA. **Isolation and identification of camelpox virus.** *Indian Journal of Animal Sciences.* 2006; 76(4): 326-327. ISSN: 0367-8318
Abstract: The identification of camelpox virus by PCR from suspected materials and its comparison with conventional methods of isolation in embryonated eggs and cell culture is described. Skin scab samples were obtained from the cheeks, nostrils, lips, limbs and scrotum of a 5-year-old camel. Vero cells were used for virus propagation. A fragment of the tumour necrosis factor-binding protein receptor-II (TNFR-II) gene was amplified using a primer pair TNFR IF and TNFR 3R. The sequence of the amplified PCR product was compared with the available sequences in the GenBank. The PCR amplification of TNFR-II gene from the DNA extracted directly from the scab sample revealed a 270 bp product and had >99% homology with earlier reported camelpox sequences available with the GenBank (Accession Nos. AF438165.1, CVU87840, AY009089.1, CVU87837 and CVU87838).
Descriptors: dromedary camels, camelpox virus, PCR, viral infections, diagnosis, diagnostic techniques, genes, identification, isolation of viral diseases of camels.

Wernery, U; Nagy, P; Amaral Doel, CM; Zhang, Z; Alexandersen, S. **Lack of susceptibility of the dromedary camel (*Camelus dromedarius*) to foot-and-mouth disease virus serotype O.** *Veterinary Record*-London. 2006 Feb 11; 158(6): 201-203. ISSN: 0042-4900
NAL call no: 41.8 V641
Descriptors: dromedaries, foot and mouth disease, disease resistance.

Wernery, U; Nagy, P; Amaral-Doel, CM; Zhang, Z; Alexandersen, S. **Lack of susceptibility of the dromedary camel (*Camelus dromedarius)* to foot-and-mouth disease virus serotype O.** *Veterinary Record.* 2006; 158(6): 201-203. ISSN: 0042-4900
NAL call no: 41.8 V641
Abstract: This short communication describes a preliminary study to determine the susceptibility of dromedaries to foot-and-mouth disease (FMD) virus (FMDV) serotype O. Two Holstein heifers and two neutered male dromedaries were inoculated subepidermolingually with FMD O inoculum. Results revealed that the body temperature of the heifers increased and the animals exhibited typical, early, unruptured vesicular lesions around the inoculation site on the tongue. Infectious FMDV was detected in the serum samples of both heifers. The two dromedaries did not exhibit any clinical signs of the disease and had no vesicular lesions on the inoculation point. The body temperature of both camels remained normal and no infectious FMDV was detected in the serum. It is concluded that dromedaries are not susceptible to FMDV infection of this particular isolate from Arabian gazelles. Nevertheless, a very high dose of the virus is used for the inoculation during the study which indicated a true low susceptibility of dromedaries.
Descriptors: dromedary camels, Holstein heifers, experimental infection, susceptibility to FMD, foot and mouth disease virus from Arabian gazelles, species comparison, body temperature, clinical aspects, disease resistance in camels, lesions.

2005

Abbas, B; Omer, OH. **Review of infectious diseases of the camel.** *Veterinary Bulletin.* 2005; 75(8): 1N-16N. ISSN: 0042-4854
URL: www.cabi-publishing.org/vb
Abstract: Camels were formerly considered resistant to most of the diseases commonly affecting livestock, but as more research was conducted, camels were found to be susceptible to a large number of pathogenic agents. For some diseases such as pox, mange, and enterotoxaemia, camels were indeed more susceptible and manifested more severe signs than other ruminants in the same ecozones. Pneumonia, mastitis and calf diarrhoea are the most common bacterial diseases of camels and are caused by a large number of microorganisms. Pox, contagious echthyma, papillomatosis and rabies are the only established viral diseases in camels. Although infection with several other viruses, including rinderpest, bluetongue, African horse sickness and rift valley fever has been demonstrated by serological methods, camels did not show signs of disease in spite of being in close contact with affected livestock. Camels also did not develop clinical signs of foot and mouth disease after housing for several weeks with affected animals. Increased interest in the camel as a multipurpose animal has been met with increased research into the aetiology and pathology of camel diseases; very few

studies, however, have been directed towards their control.
Descriptors: dromedary camels, susceptibility to diseases, disease resistance, bacterial diseases, viral diseases, pneumonia, mastitis, calf diarrhea, disease control, disease resistance, enterotoxemia, infectious diseases, parasites, mange, rabies, salmonellosis, susceptibility, *Aspergillus fumigatus*, *Clostridium perfringens*, contagious ecthyma virus, papillomavirus, contagious pustular dermatitis, CPD virus, Hyphomycetes, *Salmonella* infections, scabby mouth, clinical signs, control issues.

Abraham, G; Sintayehu, A; Libeau, G; Albina, E; Roger, F; Laekemariam, Y; Abayneh, D; Awoke, KM. **Antibody seroprevalences against pest des petits ruminants (PPR) virus in camels, cattle, goats and sheep in Ethiopia.** *Preventive Veterinary Medicine.* 2005 Aug; 70(1-2): 51-57. ISSN: 0167-5877
Abstract: A questionnaire-survey data indicated that 26% of 276 farmers reported the presence of respiratory disease in their herds in 2001. The incidence was perceived as "high" in small ruminants and camels, but as "low" in cattle. Simultaneously, 2815 serum samples from camels (n = 628), cattle (n = 910), goats (n = 442) and sheep (n = 835) were tested. The peste des petits ruminants (PPR) antibody seroprevalence was 3% in camels, 9% in cattle, 9% in goats and 13% in sheep. The highest locality-specific seroprevalences were: camels 10%, cattle 16%, goats 22% and sheep 23%. The animals had not been vaccinated against rinderpest or PPR. Antibody seroprevalences detected in camels, cattle, goats and sheep confirmed natural transmission of PPR virus under field conditions.
Descriptors: cattle, goats, sheep, camels, peste des petits ruminants, peste des petits ruminants virus, seroprevalence, geographical variation, animal diseases, disease incidence, disease transmission, rinderpest, Rinderpest virus, Ethiopia.

Ali, YH; Khalafalla, AI; Gaffar, ME; Peenze, I; Steele, AD. **Rotavirus-associated camel calf diarrhoea in Sudan.** *Journal of Animal and Veterinary Advances.* 2005; 4(3): 401-406. ISSN: 1680-5593
Abstract: The role of rotavirus in camel calf diarrhoea is studied. Faecal samples were collected from 245 diarrhoeic, 75 recovered and 12 clinically healthy camel calves from 4 different areas in Sudan (North, East, Central and West). The samples were collected during autumn, summer and winter seasons between 2000 and 2002. All samples were tested for rotavirus antigen using ELISA Kits. It was observed that 46 (13.9%) samples were positive for Group A rotavirus. Latex agglutination test was applied in 144 samples and 9 (6.3%) were positive. Immunochromatographic test (IC) were applied to 213 samples and 38 samples were positive. The overall group A rotavirus positive samples were detected in 66 samples (46 by ELISA and 20 by IC). Polyacrylamide gel electrophoresis (PAGE) was applied on 53 ELISA and IC positive samples. The characteristic Group A rotavirus electropherotype was seen in 11 samples. Electron microscopy examination was applied in 22 ELISA positive samples and 6 samples had the characteristic wheel like appearance of rotavirus. None of the 302 samples tested for coronavirus antigen using ELISA was positive. Most of the positive samples were collected from diarrhoeic calves (35 of 46 ELISA positives). The results showed the presence of rotavirus in stool samples of diarrhoeic as well as recovered and healthy camel calves indicating the significant role of rotavirus in camel calf diarrhoea in Sudan. The main age group affected was 0-3 months and males were found to be slightly more affected. Higher

prevalence of rotavirus infection was noticed during autumn than summer and winter seasons.

Descriptors: dromedary camels, calves, age differences, sex differences, calf diarrhea rotavirus, diarrhea, disease prevalence, risk factors, seasonal variations, Sudan.

Ali, YH; Khalafalla, AI; El Amin, MA. **Epidemiology of camel calf diarrhoea in Sudan: seroprevalence of camel rotavirus infection.** *Journal of Animal and Veterinary Advances.* 2005; 4(3): 393-397. ISSN: 1680-5593

Abstract: The epidemiology of camel calf diarrhoea in four different areas in Sudan, River Nile (North), Gedarif (East), Sennar and Blue Nile (Central to South) and Kordofan (West), was studied. Data about the epidemiology of camel calf diarrhoea and its treatment regimen adopted by the owners were collected and analysed. A total of 383 camel herds were investigated about the incidence of camel calf diarrhoea during wet and dry seasons between 2000 and 2002 in the focused areas. The overall morbidity rate of camel calf diarrhoea in the four areas of study was 83%, while mortality and case fatality rates were 39.9 and 43.3%, respectively. The morbidity, mortality and case fatality rates of camel calf diarrhoea were found to be almost the same in the four areas during the wet and dry seasons with slight increase during the wet season. With regards to different treatment regimens adopted to diarrhoeic camel calves by the owners, 38.2% of the cases were left without treatment, 58.51% received antibiotics while administration of other drugs (symptomatic treatments, traditional medicines) constituted a very small percentage. A serological survey was conducted using group A rotavirus antibody detection ELISA on 530 camel sera. The overall percentage of positive samples was 48.1%. Seropositivity was detected in all areas of study with slightly higher percentages in Sennar and Blue Nile States. The overall percentage of high antibody titres were 4+ or 31.4% and 3+ or 22%. Most of the seropositive samples were collected from camels at 18-36 month of age and adult camels with slightly higher percentage in males than females (56.5% males vs. 43.5% females). A correlation was found between the seropositivity and the clinical status of diarrhoea. The highest percentage of seropositivity was found in clinically healthy camel calves (69.7%). The results show the high prevalence of camel calf diarrhoea caused by rotavirus in Sudan. Reproduced with permission of CAB.

Descriptors: dromedary camel calves, calf diarrhea, age differences, sex differences, disease prevalence, disease surveys, epidemiology, morbidity, mortality, calf diarrhea rotavirus, Sudan.

El Hakim, UA. **Foot and mouth disease in camels: role of camels in the epizootiology and transmission of foot and mouth disease in Egypt.** *Assiut Veterinary Medical Journal.* 2005; 51(107): 189-203. ISSN: 1012-5973. Note: In English with an Arabic summary.

Abstract: To study foot and mouth disease (FMD) in camels and investigate the role played by camels in the epizootiology and transmission of the disease to cattle, 50 camel and 50 cattle (in contact with camels) were used. All these animals were examined clinically and virologically (virus isolation) in addition to examination using RT-PCR. VI and RT-PCR were performed two times at one month apart. Clinical examination at the beginning of the study showed that only three camels were suffering from excessive salivation while the remaining camels and cattle were apparently healthy. After 30 day from contact between camels and cattle, salivation, nasal discharge, increase in body temperature and lameness were recorded

in seven cattle. During the first VI, FMDV was isolated from 14 camels while all cattle were negative. On the second VI, FMDV was isolated from 17 camel and 25 cattle. FMD viral RNA was identified in 19 camel while all examined cattle were negative during the first RT-PCR. After performing the second RT-PCR, FMD viral RNA was observed in 24 camel and 27 cattle. Two serotypes (O and A) of FMDV were detected in both species and the genetic relationship between FMDV in camels and cattle was observed using RT-PCR. Results of this work proved that RT-PCR is more sensitive than VI in the diagnosis of FMD in camels and cattle in Egypt. In addition, this technique can be used in serotyping FMDV and studying the genetic relationship between FMDV in camels and cattle. The study also showed that FMDV is present in camels even without clinical signs and can be a source of infection for cattle. This is the first study on the use of RT-PCR in the diagnosis and typing of FMDV in camels.

Descriptors: dromedary camels, cattle, foot and mouth disease, FMD virus, asymptomatic infections, diagnosis, diagnostic techniques, disease transmission, disease vectors, polymerase chain reaction, PCR, reverse transcriptase, Egypt.

Lvov, DK; Butenko, AM; Gromashevsky, VL; Shchelkanov, MYu; Kovtunov, AI; Yashkulov, KB; Prilipov, AG; Kinney, R; Aristova, VA; Dzharkenov, AF; Samokhvalov, EI; Savage, HM; Galkina, IV; Deryabin, PG; Bushkieva, BTs; Gubler, DJ; Kulikova, LN; Alkhovsky, SK; Moskvina, TM; Zlobina, LV; Sadykova, GK; Shatalov, AG; Lvov, DN; Usachev, VE; Voronina, AG.

West Nile and other emerging-reemerging viruses in Russia. In: G. Berencsi; AS Khan; J. Halouzka (Editors). *Emerging Biological Threat: Proceedings of the –NATO Advanced Research Workshop on Emerging Biological Threat, Budapest, Hungary, 5-8 October 2003*. 2005; 33-42. ISBN: 158603555X

Abstract: A study was conducted to investigate the occurrence of West Nile virus (WNV) and other emerging and reemerging viruses in Volga-delta and Volga-Akhtuba, Russia, during 2001-02. A total of 38 virus strains were isolated, including 12 WNV, 3 Crimean-Congo haemorrhagic fever virus (CCHFV), 4 Dhori virus (DHOV) and 19 Batai virus. All WNV strains were isolated in the Volga-delta. All strains in natural habitats were obtained from cormorants [*Phalacrocorax*] and in anthropogenic biocoenoses from *Anopheles messeae,* corvids (mostly crows [*Corvus*]) and *Hyalomma marginatum*. CCHFV strains were isolated from patients in Volga-Akhtuba, as well as from larvae and nymphs of *H. marginatum* collected from a hare in Volga-delta. From the same hare and ticks, DHOV strains were also isolated. Batai virus was isolated from *A. messeae.* Reverse transcriptase-polymerase chain reaction (RT-PCR) detected WNV in tissues of birds, mostly those collected in the Volga-delta and most often among cormorants, coots, herons, gulls [Laridae] and terns [Laridae] in natural biocoenoses. In anthropogenic biocoenoses, positive results were obtained among ground-feeding birds, especially among corvids and mammals. RT-PCR investigation of mosquitoes showed that they were involved in virus circulation among all predominant species in anthropogenic biocoenoses (*A. hyrcanus*, *Culex pipiens*, *C. modestus* and *A. messeae*) and natural biocoenoses (*Coquillettidia richiardii* and *A. hyrcanus*). All isolated WNV strains and RT-PCR positive samples belonged to genotype 1. Serological examination of domestic animals showed that they were infected by WNV, with infection rates being highest among horses, moderate among cattle and camels, and lowest among sheep.

Descriptors: humans, horses, sheep, camels, domestic animals, aquatic wild birds, *Corvus,*

crows, hares, biocoenosis, emerging infectious diseases, epidemiology, genotypes, molecular epidemiology, strains, viral diseases, WNV, Batai virus, West Nile fever, Crimean Congo hemorrhagic fever virus, Dhori virus, Orthobunyavirus, mosquito vectors, *Anopheles hyrcanus*, *Anopheles messeae,Coquillettidia richiardii, Culex modestus*, *Culex pipiens*, *Hyalomma marginatus*, Russia.

Paweska, JT; Mortimer, E; Leman, PA; Swanepoel, R. **An inhibition enzyme-linked immunosorbent assay for the detection of antibody to Rift Valley fever virus in humans, domestic and wild ruminants.** *Journal of Virological Methods.* 2005; 127(1): 10-18. ISSN: 0166-0934
Abstract: This paper describes the development and validation of an inhibition ELISA based on gamma-irradiated tissue culture-derived antigen for the detection of antibody to Rift Valley fever virus (RVFV) in humans, domestic and wild ruminants. Validation data sets derived from field-collected sera in Africa (humans=1367, cattle=649, goats=806, sheep=493, buffalo=258, camels=156) were categorized according to the results of a virus neutralization test. In addition, individual sera from 93 laboratory workers immunized with inactivated RVF vaccine, 136 serial bleeds from eight sheep experimentally infected with wild-type of RVFV, and 200 serial bleeds from 10 sheep vaccinated with the live-attenuated strain of the virus, were used to study the kinetics of RVFV antibody production under controlled conditions. At cut-off values selected at 95% accuracy level by the two-graph receiver operating characteristic analysis the ELISA sensitivity ranged from 99.47% (humans) to 100% (sheep, buffalo, camels). The specificity ranged from 99.29% (sheep) to 100% (camels). Compared to virus neutralization and haemagglutination-inhibition tests, the ELISA was more sensitive in detection of the earliest immunological responses in experimentally infected and vaccinated sheep. Our results demonstrate that the ELISA format reported here can be used as a safe, robust and highly accurate diagnostic tool in disease-surveillance and control programmes, import/export veterinary certification, and for monitoring of the immune response in vaccinees. Reproduced with permission of CAB.
Descriptors: buffaloes, dromedary camels, cattle, humans, goats, sheep, Rift Valley fever virus, antibodies, antibody testing, antibody detection, diagnostic techniques, ELISA, human diseases, immune response, immunization, immunodiagnosis, live vaccines, attenuated vaccines, Rift Valley fever, seroconversion, vaccination, Kenya, South Africa, Tanzania, Uganda.

Sopyev, B; Divanov, B; Charyev, C. **Diseases of camels, their preventive maintenance and treatment.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 60-66. ISBN: 1586034731
Descriptors: dromedary camels, Bactrian camels, acaricides, brucellosis, clinical aspects, diagnosis, diminazene, disease prevalence, disease prevention, drug therapy, azidine, berenil, hydatid disease, hydatidosis, echinococcosis, epidemiology, helminthoses, licorice, mange, plague, smallpox, trypanosomiasis, vaccination, *Brucella*, *Cephalopina*, *Echinococcus*, *Glycyrrhiza*, *Sarcoptes scabiei*, *Taenia hydatigena*, *Trypanosoma*, *Yersinia pestis*, Turkmenistan. Central Asia.

Wernery, U. **The most important infectious diseases in camelids.** In: B. Faye and P. Esenov (Editors). *Desertification Combat and Food Safety: The Added Value of Camel Producers, Ashkabad, Turkmenistan, 19-21 April 2004.* IOS Press, Amsterdam. 2005; 67-69. ISBN: 1586034731

Descriptors: camelids, dromedary camels, Bactrian camels, anthrax, aspergillosis, brucellosis, coccidioidomycosis, coccidiosis, endotoxemia, enterotoxemia, melioidosis, mycoses, nematode, infections, paratuberculosis, Johne's disease, pasteurellosis, rabies, salmonellosis, scabies, smallpox, trematode infections, trypanosomiasis, tuberculosis, zoonoses, influenza, *Aspergillus*, *Bacillus anthracis*, borna disease virus; *Brucella*, *Burkholderia pseudomallei*, *Clostridium perfringens*, *Coccidioides immitis*, Digenea, *Eimeria*, equid herpesviruses; *Mycobacterium avium* subsp *paratuberculosis*, *Mycobacterium tuberculosis*, *Nematoda*, *Pasteurella*, rabies virus, *Rhodococcus* bacteria, *Rickettsia*, Rotavirus, *Salmonella* infections, *Sarcoptes scabiei*, *Trypanosoma evansi*.

2004

Abu Elzein, EME; Housawi, FMT; Al Afaleq, AI; Gameel, AA; Ramadan, RO. **A note on experimentally induced severe camel orf (Auzdyk disease) in dromedary camels.** *Journal of Camel Practice and Research.* 2004; 11(2): 101-102. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Descriptors: dromedary camels, experimental infection, Contagious ecthyma virus, CPD virus, contagious pustular dermatitis, orf, scabby mouth, sore-mouth, ulcerative dermatosis, experimental transmission, clinical picture.

Abu Elzein, EME; Housawi, FMT; Al Afaleq, AI; Ramadan, RO; Gameel, AA; Al Gundi, O. **Clinico-pathological response of dromedary camels and sheep to cross-experimental infection with two virulent orf viruses originating from camels and sheep.** *Journal of Camel Practice and Research.* 2004; 11(1): 15-19. ISSN: 0971-6777

URL: www.camelsandcamelids.com

Abstract: The clinicopathological response of camels and sheep to an experimental cross infection with two virulent field orf viruses (contagious ecthyma virus), originating from camels and sheep, was compared. 10 and 6 sheep and Arabian camels were used in this study, respectively. Sheep were completely refractory to infection with the camel orf virus. Similarly, the camels were resistant to infection with the orf virus originating from sheep. The sheep developed classical clinicopathological lesions against the orf virus of sheep origin and gave a low level of seroconversion. Camels which were inoculated with the camel orf virus also showed classical clinicopathological signs, but no seroconversion was detected. The results were discussed in relation to the epidemiology of the disease in Saudi Arabia. Reproduced with permission of CAB.

Descriptors: dromedary camels, sheep, contagious pustular dermatitis, CPD virus, orf, scabby mouth, sore mouth, antibodies, clinical aspects, cross infection, disease prevalence, cytopathogenicity, disease resistance, epidemiology, experimental infection, histopathology, immune response, seroconversion, skin lesions, virus neutralization, contagious ecthyma virus, Saudi Arabia.

Ali, YH; Khalafalla, AI; Gaffar, ME; Peenze, I; Steele, A D. **Detection and isolation of group A rotavirus from camel calves in Sudan.** In: CTNF Iskandar; L Hassan; GK Dhaliwal; R Yusoff; AR Omar; MAKG Khan (Editors). *Animal Health: A Breakpoint in Economic Development? The 11 th International Conference of the Association of Institutions for Tropical Veterinary Medicine and 16 th Veterinary Association Malaysia Congress, 23-27 August 2004, Petaling Jaya, Malaysia.* 2004; 302-304. ISBN: 9832871662

Abstract: A total of 332 fecal samples were collected from diarrheic as well as recovered and healthy camel calves in four different areas in Sudan (north, east, central to south and west). Using ELISA, 46 samples (13.9%) were found positive for group A rotavirus. Using EM, 6 out of 22 ELISA positive samples showed the characteristic morphology of rotavirus. Group A rotavirus RNA profile was seen in 11 of 51 tested samples using polyacrylamide gel electrophoresis (PAGE). None of 302 samples examined for coronavirus antigen was positive. The results indicate the significant role of rotavirus in the epidemiology of camel calf diarrhea in Sudan. Group A rotavirus subgroup specificity was determined in 31 out of 42 tested samples, in which subgroup II was predominated (54.8%). Eighteen of 21-camel group A rotavirus samples was isolated in MA104 cells, which were identified by ELISA and EM. Cytopathic effects (CPE) were manifested as rounding, elongation, triangulation, vacuolation and granulation of cells while the cell sheet remains intact. The CPE appeared on days 3-5 on the 1st-2nd passages. To our knowledge this is the first report for the determination of camel group A rotavirus subgroup specificity and isolation of camel rotavirus in cell culture.

Descriptors: dromedary camels, diarrhea, group A rotavirus, scouring disease, disease prevalence, epidemiology, Sudan.

Chandel, BS; Kher, HN; Chauhan, HC; Vasava, KA. **Serological survey of antibodies to bluetongue virus in domestic ruminants in Gujarat.** *Indian Veterinary Journal.* 2004; 81(7): 737-740. ISSN: 0019-6479

URL: http://www.indvetjournal.com

NAL call no.: 41.8 IN2

Abstract: A serological survey of bluetongue virus (BTV) group specific precipitating antibodies was conducted in sheep, goats, cattle, buffaloes and camels in Gujarat, India [date not given]. 1623 sera samples were tested using the agar gel immunodiffusion (AGID) method, which included 908 sheep (4 breeds), 199 goats, 150 cattle (4 breeds), 216 buffaloes and 150 camels (2 breeds). It was shown that 407 (25.07%) sera were positive for BTV group specific precipitating antibodies. Species-wise seroprevalence was 24.66, 29.15, 24, 34.72 and 9.33% in sheep, goats, cattle, buffaloes and camels, respectively. The rate of seroprevalence in different breeds and status were recorded and are also discussed. Reproduced with permission of CAB.

Descriptors: dromedary camels, buffaloes, cattle, goats, sheep, antibodies, antibody testing, disease prevalence, disease surveys, domestic animals, epidemiological surveys, epidemiology, immunodiffusion tests, livestock, serological surveys, seroprevalence, viral diseases, bluetongue virus, Gujarat, India.

Chauhan, HC; Chandel, BS; Gerdes, T; Vasava, KA; Patel, AR; Kher, HN; Singh, V; Dongre, RA. **Seroepidemiology of bluetongue in dromedary camels in Gujarat, India.** *Journal of Camel Practice and Research.* 2004; 11(2): 141-145. ISSN: 0971-6777

URL: http://www.camelsandcamelids.com
Abstract: In this study, out of 326 sera samples of camels in North Gujarat and Kutch, Gujarat, India, screened for the presence of bluetongue virus (BTV) group specific antibodies [date not given], the overall rate of seroprevalence was 26.69 and 38.34% by BT-AGID and c-ELISA, respectively. Seropositivity was observed in all the animals irrespective of their locations. However, the higher rate of seroprevalence (31.33 and 43.14%) was detected in the camels in BSF, Dantiwada and in the camels showing stiffness and trypanosomiasis by BT-AGID as well as c-ELISA compared to the other camels. BTV serotype specific neutralizing antibodies against BTV serotypes 1, 2, 3, 4, 10, 12, 14, 15, 16, 17, 18, 20, 21 and 24 were detected. Reproduced with permission of CAB.
Descriptors: dromedary camels, diagnosis, epidemiology, disease prevalence, disease surveys, erological surveys, seroprevalence, ELISA, neutralizing antibodies, pathogen serotypes, *Trypanosoma,* trypanosomiasis, viral diseases, bluetongue virus.

El Hakim, UA. **Bovine virus diarrhea in camels: role of camels infected with bovine viral diarrhea virus in transmission of the disease.** *Assiut Veterinary Medical Journal.* 2004; 50(102): 106-121. ISSN: 1012-5973. Note: In English with an Arabic summary.
Abstract: This study was conducted to investigate bovine diarrhoea virus (BVD) in camels and to determine the role played by camels in the transmission of BVDV to cattle. 50 cattle in contact with 50 camels were subjected to clinical, serological, virological and biotechnological examinations. Initial laboratory investigations confirmed that all the cattle were free from BVD at the beginning of the study. Clinical examination, indirect ELISA, virus isolation and reverse transcription-polymerase chain reaction (RT-PCR) were performed for each animal. Indirect ELISA, virus isolation and RT-PCR were carried out twice, one month apart. No clinical signs were observed in camels, although some animals were positive for the presence of BVDV in one or more of the previously mentioned tests (except 2 camels that showed severe signs). In cattle, 14 out of 23 infected animals suffered from clinical signs 3 weeks after the study was started, whereas the rest of the animals were apparently healthy. All examined camels were negative in the 1st and 2nd ELISA except for 2 camels that showed a weak positive result in the 2nd ELISA. No cattle were positive in the 1st ELISA, but 16 cattle were positive in the 2nd ELISA. BVDV was observed from 11 camels in the 1st and 2nd isolation, whereas all examined cattle were negative for 1st virus isolation. However, BVDV was isolated from 17 cattle in the 2nd virus isolation. In the first RT-PCR, BVD viral nucleic acid (RNA) was detected in 15 camels. No BVD viral nucleic acid was detected in the all cattle examined during the 1st RT-PCR, whereas in the 2nd RT-PCR, viral nucleic acid of BVD was detected in 15 camels and 23 cattle. Camels and cattle that gave a positive result in ELISA and virus isolation were positive with RT-PCR. Results of this study proved that camel could be infected with BVDV without showing clinical signs. Thus, it could transmit the virus to cattle through contact even for a relatively short time and remain infective for a long time without observation. RT-PCR technique seemed to be more sensitive than ELISA and virus isolation in the diagnosis of persistent form of BVD, whereas virus isolation was more sensitive than ELISA. Camels could play a very important role in the persistence and transmission of BVDV infection among cattle. Therefore, any epidemiological studies on BVDV and control programme planning should put this point of view in consideration. At the same time, RT-PCR technique seemed to be very sensitive and suitable for the diagnosis

of BVDV infection in cattle and camels, especially when other tests failed to detect the infection. Therefore, this technique is recommended for use in the screening of camels (especially those imported from Sudan) for their freedom from BVDV. This is the first study on the role of camels in the transmission of BVDV to cattle and the first to use RT-PCR assay in the diagnosis of BVDV in camels, in addition to the first recognition of BVDV genotype-II in Egypt. Reproduced with permission of CAB.
Descriptors: dromedary camels, cattle, bovine diarrhea virus, carrier state, persistent infection, clinical aspects, diagnosis, diagnostic techniques, disease transmission, ELISA, epidemiology, isolation, ELISA, polymerase chain reaction, PCR, reverse transcriptase, serology, Egypt.

El Hassan, OM; Khalafalla, AI; El Hassan, SM. **Detection of antibodies against camel contagious ecthyma in Sudan using passive haemagglutination test (PHT).** *Journal of Animal and Veterinary Advances.* 2004; 3(6): 384-387. ISSN: 1680-5593
Abstract: Antibodies against camel contagious ecthyma virus (CCEV) in camel sera were detected by passive haemagglutination test (PHT) with a mean antibody prevalence of 35%. The test revealed that the infection is widespread in all parts of the Sudan where camels are raised with variable prevalence rate. The antibody prevalence was 42% in Butana, 41% in Darfor and 19% in Blue Nile areas. The antibody prevalence was higher after the rainy season (87.5%) compared to before the rainy season (2.8%) confirming seasonality associated with the rainy season (June-October). The prevalence in the age group of 1-4 years was relatively higher (41%) in comparison with calves less than one year (32%) and adults (35%). Reproduced with permission of CAB.
Descriptors: dromedary camels, age differences, antibody testing, diagnosis, diagnostic techniques, antibody tests, disease prevalence, disease surveys, epidemiology, passive hemagglutination, seasonal variation, seroprevalence, wet season, contagious ecthyma virus, parapoxvirus, orf, scabby mouth, rainy season, seasonal changes, Arab Countries, Sudan.

Gerdes, GH. **Rift Valley fever.** *Revue Scientifique et Technique Office International des Epizooties.* 2004; 23(2): 613-623. ISSN: 0253-1933. ISBN: 9290446218. Note: In English with a French and Spanish summary.
Abstract: Rift Valley fever (RVF) is an arthropod-borne viral disease of ruminants, camels and humans. It is also a significant zoonosis which may be encountered as an uncomplicated influenza-like illness, but may also present as a haemorrhagic disease with liver involvement; there may also be ocular or neurological lesions. In animals, RVF may be inapparent in non-pregnant adults, but outbreaks are characterised by the onset of abortions and high neonatal mortality. Jaundice hepatitis and death are seen in older animals. Outbreaks of RVF are associated with persistent heavy rainfall with sustained flooding and the appearance of large numbers of mosquitoes, the main vector. Localized heavy rainfall is seldom sufficient to create conditions for an outbreak; the simultaneous emergence of large numbers of first generation transovarially infected mosquitoes is also required. After virus amplification in vertebrates, mosquitoes act as secondary vectors to sustain the epidemic.
Descriptors: ruminants, camels, humans, zoonotic disease, Rift Valley Fever, mosquito borne disease, disease outbreaks, etiology, diagnosis, disease control, disease surveys, disease

transmission, epidemiology, global warming, abortion, hepatitis, jaundice, mortality, pathogenesis, public health, zoonoses.

Housawi, F; Abu Elzein, ET; Ahmed Gameel; Mohamed Mustafa; Al Afaleq, A; Gilray, J; Al Hulaibi, A; Nettleton, P. **Severe Auzdyk infection in one-month-old camel calves (*Camelus dromedarius*).** *Veterinarski Arhiv.* 2004; 74(6): 467-474. ISSN: 0372-5480. Note: In Englidh with a Croatian summary.

Abstract: Two approximately one-month-old, one-humped camel calves (*C. dromedarius*) were presented to the University Veterinary Teaching Hospital, King Faisal University, Al-Hasa, Saudi Arabia (SA), with severe lesions on the lips and hard palates (March 2002). Samples were collected and virological, pathological and serological investigations were carried out. The disease was confirmed to be Auzdyk (camel contagious ecthyma). The situation is discussed in relation to the severity of the disease, a condition seen for the first time in very young camels in SA. The results confirmed that very young camel calves can suffer a severe form of this disease. Reproduced with permission of CAB.

Descriptors: dromedary camels, young animals, Auzdyk, lesions on lips and hard palate, scabby mouth, orf, dermatitis, contagious ecthyma virus, contagious pustular dermatitis, CPD virus, skin diseases, case reports, clinical aspects, diagnosis, diagnostic techniques, Saudi Arabia.

Khalafalla, AI. **Biological properties of camel contagious ecthyma virus.** In: CTNF Iskandar; L Hassan; GK Dhaliwal; R Yusoff; AR Omar; MAKG Khan (Editors). *Animal Health: A Breakpoint in Economic Development? The 11 th International Conference of the Association of Institutions for Tropical Veterinary Medicine and 16 th Veterinary Association Malaysia Congress, 23-27 August 2004, Petaling Jaya, Malaysia.* 2004; 278-280. ISBN: 9832871662

Abstract: Camel contagious ecthyma (CCE) is a sparsely studied disease affecting young camels up to 3 years old. In this study, properties such as cell culture spectrum, plaque morphology, morphological developments of viral particles, growth in embryonated eggs and cellular changes, host range as well as the presence of five parapoxvirus (PPV) genes were studied. The results have suggested that the virus is a species-specific camel pathogen and that no virus cycles occurs between camel and sheep or goats. Reproduced with permission of CAB.

Descriptors: dromedary camels, young animals, contagious pustular dermatitis, sore mouth, ulcerative dermatosis, CCE, Contagious ecthyma virus, parapoxvirus, virology, characterization, hosts.

Kitching, RP. **Camelpox.** In: JAW Coetzer; RC Tustin. ***Infectious Diseases of Livestock.*** Volume Two. By Oxford University Press. 2004; (Ed.2): 1300-1301. ISBN: 0195761707

Descriptors: dromedary camels, camel pox, camel pox virus, clinical picture, etiology, clinical aspects, diagnosis, differential diagnosis, disease control, epidemiology, pathogenesis, viral diseases.

Wernery, U; Kaaden, OR. **Foot-and-mouth disease in camelids: a review.** *Veterinary Journal.* 2004; 168(2): 134-142. ISSN: 1090-0233

DOI: http://dx.doi.org/10.1016/j.tvjl.2003.10.005

NAL call no: SF601.V484

Abstract: Foot-and-mouth disease (FMD) in South American camelids, in dromedaries and Bactrians is reviewed. Recent well-executed experimental studies in New World camels indicate that, although the llama and alpaca can be infected with FMD virus (FMDV) by direct contact, they are not very susceptible and do not pose a risk in transmitting FMD to susceptible animal species. They do not become FMDV carriers. Reports on FMD in dromedaries are, however, conflicting. Serological investigations in Africa and the United Arab Emirates (UAE) on thousands of camel sera were negative and experimental infections have been conducted on only a few dromedaries with one serotype and in one country. The design and execution of most of these experiments were poor and therefore the conclusions are questionable. From these investigations, it seems that dromedaries can contract the disease after experimental infection and through close contact with FMD diseased livestock, but do not present a risk in transmitting FMD to susceptible animals. They do not become FMDV carriers. Recent reports from Mongolia describe similar FMD lesions in Bactrian camels. However, so far no samples have tested positive for FMD. To clarify the situation in Bactrians, samples from suspected clinical cases should be tested because other viral vesicular diseases cannot be distinguished from FMD. Thus, further research on the epidemiology of FMD in camelids is necessary. This would include large-scale serological investigations and experimental infections with different FMD serotypes in connection with susceptible contact animals. The Office International des Epizooties (OIE) Code chapter on FMD includes camelids as being susceptible species to FMD, giving the impression that they are similar to cattle, sheep, goats and pigs in their potential involvement in the epidemiology of FMD. This is clearly not the case, and this issue should be re-addressed by the relevant authorities. Reproduced with permission of CAB.

Descriptors: Bactrian camels, dromedary camels, experimental infection, foot and mouth disease, FMD virus, disease prevalence, disease transmission, susceptibility to FMD, epidemiology, disease geographical distribution, lesions, reviews, Africa, Mongolia, United Arab Emirates.