Information Resources on the Care and Welfare of Horses

AWIC Resource Series No. 36

November 2006

Updates Housing, Husbandry, and Welfare of Horses, 1994

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U.S. Department of Agriculture

Published by:

U. S. Department of Agriculture
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Forward

This information resource came to fruition through the diligence of a student employee at the Animal Welfare Information Center. The document contains a comprehensive bibliography and extensive selection of web site resources. Two papers introducing horse care and welfare issues are also included. Dr. C. Stull of the University of California at Davis presents an overview of equine issues in the United States and Dr. D. Mills of the University of Lincoln gives an introduction to worldwide equine ethics and concerns.

Horse welfare issues are coming increasingly to the forefront of animal issues. An economic impact study conducted by Deloitte Consulting LLP for the American Horse Council Foundation in 2005 indicated that there are over 9.2 million horses in the United States with over 4.6 million people involved as horse owners, service providers, employees and volunteers. Over the past few years, the US Congress has discussed bills related to the transportation and slaughter of horses as well as the sale of wild free-roaming horses and burros. Additionally, concerns over the production of pregnant mare’s urine for hormone replacement therapy (PMU ranching) led to the establishment of groups who placed animals in new homes after ranches were closed. For an overview of the equine ranching industry, see the article PMU Ranching Demonstrates Benefits of Self-Regulation by Norman Luba in the Animal Welfare Information Center Bulletin Vol 10., No. 1-2 (1999).

In the United States, the federal Horse Protection Act was first passed in 1972 in order to prohibit painful soring practices and continues to be enforced today. Under the Animal Welfare Act, only horses used in biomedical research, teaching or testing are regulated. The Animal Legal and Historical Center at the Michigan State University College of Law provides a list of federal and state horse related statutes in the United States. Worldwide, many countries perceive horses as pets rather than farm animals. In the United Kingdom (UK), DEFRA provides a gateway to horse issues in government, including links to information on health, breeding, and passports for travel. An overview of international anti-cruelty laws is also provided by the Animal Legal and Historical Center at the Michigan State University College of Law.

This document will continue to evolve as new research is conducted and published. It is hoped that this information resource is a starting point for all people who care and work with horses.

About this Document

This publication updates and expands AWIC's Housing, Husbandry and Welfare of Horses, 1994. The bibliographic chapters are divided into subject areas that cover anesthesia and analgesia, behavior, environmental enrichment, housing, law and legislation, nutrition and feeding, pasture, equine ranching,
safety, training and transportation. Citations included in these chapters were published between 1994 and December 2006 and selected from searches conducted using a variety of agricultural, medical and life science databases. In each chapter, the citations are arranged alphabetically according to the last name of the primary author. Web sites specific to each topic area are included at the end of the chapters.

Each citation in the bibliographies contains descriptor terms, an abstract when available, and the NAL call number if the particular source is available at the National Agricultural Library (NAL). Visit the NAL web site for information on how to request library materials.

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 2008.

Contact the Animal Welfare Information Center
April 24, 2008
Horse Welfare

by Daniel Mills, PhD

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The scientific assessment of equine welfare has grown markedly over the last decade, but welfare assessment is not an easy task as it is by its very nature multidisciplinary. It is therefore timely for a review of available resources to help all of us interested in improving horse welfare. It is particularly important as there is still no complete consensus on what “welfare” really is, even among welfare scientists. Some will emphasise the importance of health, others, feelings and yet others the ability for an animal to fulfil its natural potential. For some, the feelings of an individual at a given time should be referred to as its well-being, with welfare considering not just the animal’s current feelings but also the threats to its well-being. Thus it might be argued that horses whose work puts them at risk of particular injury, such as limb injury in race horses, have worse welfare than those whose work does not pose such risks. This approach can be useful when considering welfare within the context of populations, but it is important not to forget the individual. Even if the risk is 1 in 10000 for a catastrophic injury, the consequences for that one individual that is injured are disastrous. Some also consider the effort required by an animal to maintain its state of well-being. Thus Broom (1986) defines welfare as the state of an animal with regards to its attempts to cope with its environment. This would imply that a horse kept in an optimal ambient temperature may be thought to have better welfare than one who must devote additional resources to the maintenance of such a temperature. It is therefore important to clarify what an individual means by the term “welfare” especially when one animal’s welfare is said to be better for another.

However, a publication like this makes no judgement and allows individuals and groups to access the latest information they need for their purposes. It is sad truth that well-meaning intentions do not always translate into well-being of our charges, and horses are particularly a victim of this. Being kept in quarters that look comfortable to carers may not be most appropriate for horses, who have strong social tendencies and a physiology and psychology adapted to a life feeding on open grasslands.

A common criticism of those seeking to assess animal welfare objectively is that we cannot know the mind of another; but this criticism reflects a failure to understand the fundamental principles of the scientific method. Science makes progress through hypotheses which can be tested but which can never be shown to be completely true. In this respect welfare is no different to any other scientific pursuit. All scientific evidence carries with it a degree of uncertainty and we decide what level we are prepared to accept (often a 5% chance level). However these principles are often forgotten by sceptics who, for whatever reason, appear not to want to contemplate what might be happening in the minds of other animals. There is a need for those interested in animal welfare to make clear and defend the scientific basis of their work in order to propose what is possible, realistic and reasonably justifiable.

There are many reasons to be interested in horse welfare. From an ethical perspective it might be argued that we have a responsibility to minimise the suffering we cause to other animals with whom we interact either directly or indirectly. From a practical point of view, animals with good welfare might be expected to perform their work more efficiently. From an academic perspective the assessment of animal welfare is also a challenging intellectual task. However, it is not the aim of this publication to argue why we should measure horse welfare or the ethics of what we do to horses, rather it is hoped that to bring together information to help increase awareness of the methods at our disposal for the
assessment and management of the welfare of the horse in a broad range of contexts.

A practical problem for advances in equine welfare concerns the need for funding in this field. Horses are expensive animals to keep and study; and although they are of enormous economic importance, the industry is fragmented and often poorly represented to governments and other funding bodies as a significant concern, except perhaps for the case of the equine athlete. The welfare research field has largely been driven by concern over whether what we do to animals is acceptable and not purely by the intellectual issues involved. As a result research funding has focussed on political priorities. Thus a large proportion of equine welfare research focuses on the problems faced at the extremes of athletic performance, which is largely irrelevant to the vast majority of equids.

More broadly the scientific study of animal welfare has invested enormously in how to assess suffering so that it can be minimised, rather than the evaluation of well-being and positive mental states, which is perhaps the goal of the average carer. Trying to measure “happiness” is not only an enormous intellectual challenge, but also a completely alien concept to many funding bodies and so generally given very little attention despite its central importance to those interested in animal welfare. Scientists also vary in the subjective feelings they are willing to ascribe to a horse (see Price et al., 2002, for an illustration of attitude amongst U.K. veterinary surgeons), and so this field is likely to remain a contentious area of research. Politically speaking laboratory and farm animal welfare have been major areas of concern and so they have been the focus for funding with little money being available to those interested in the well-being of companion animals including the horse. This does not mean that there are any fewer problems in these species, just that they are largely overlooked by both the public and funding bodies. For these reasons there are significant gaps in our scientific knowledge of horse welfare, but we are able to recognise rational approaches to its scientific study. This publication helps to identify what we know and what can be applied, but will also identify the gaps in our knowledge.

Horses have evolved to be adapted to their natural environment and so if the behaviour of a horse resembles this natural state then it might be thought that it is normal and suffering minimal. However, the occurrence of normal behaviour patterns does not necessarily imply good welfare. Some normal behaviours are clearly associated with aversion, such as flight from a predator and so their occurrence is undesirable. In other instances the significance of the behaviour depends on the context. For example, horses may move into water away from dry land in order to avoid the effects of blood-sucking insects which can cause anaemia. Whilst this is obviously beneficial to the horse, this behaviour is not without its costs. They may reduce grazing or reduce other important behaviours as a trade off for escaping the insects. So, whilst standing idle or engaging in social exchanges with others does not appear to be a behaviour of concern, in this case the horses would undoubtedly be better off doing something else if the insects were absent.

Some of the adaptations horses have evolved to help them to cope with the challenges they encounter in their natural environment are sufficient to protect them when faced with challenges unique to the domestic environment, but in other cases the horse may not be able to adapt adequately, in which case there must be concern for the animal’s welfare. The problem is identifying when these natural systems are being over-taxed. Behaviour is a form of adaptation to the environment and so its evaluation is dependent upon context. It is important not to make unjustified generalisations. Two horses in different environments might be expected to show different behaviours as well as different patterns of behaviour as part of their healthy adaptation to the different environments. So there may be no norm against which the behaviour of a captive animal can be meaningfully compared. Individuals should avoid the temptation to make arbitrary comparisons when it suits their case, for example the amount of time a horse should spend grazing or alert in a day to be normal or psychological healthy. There is no logic in the assumption that quantitative or qualitative differences in behaviour necessarily imply a difference in welfare. Instead it is important to appreciate the function and regulation of each behaviour in the context in which it occurs, and look for other evidence of the welfare status of the individual. Understanding the natural behaviour of horses is important to the scientific study of equine welfare as it is through this we can appreciate the functional significance of a given behaviour and the mechanisms which may underlie the adaptability of the horse and when these may be strained in an unnatural setting, for example concentrate feeding or the use of raised hay nets.

When trying to evaluate the risks of a given horse management system, we might use one of two approaches and the information in this publication is useful to both processes. We might consider what is within the system which might potentially compromise the welfare of the animal or what signs come out of the system. The former are indirect indicators of areas of potential focus while the latter are more direct measures of what is happening in practice. In both
cases the horse, its management and its environment make up the system of interest. Indirect measures can be useful as they can flag up areas of potential concern or interest, for example consider a horse being kept in a livery yard versus one being kept for racing or PMU production. They have different demands put upon them, might be kept in quite different environments by people of differing level of skill in welfare monitoring. One system might be considered lower risk than another, but that does not mean that the welfare is necessarily safe nor the opposite true in a higher risk system, but it does allow prioritisation of concern. The information on the effects of different types of procedures (management, training, veterinary or otherwise), within this particular publication is therefore particularly useful in this regard. The welfare can only be reasonably determined by looking at the direct measures (outputs) of the system, which relate to the behaviour and physiology of the horses and again this publication will help in the evaluation of these measures.

Pain is often the primary concern of most carers and is defined as: “An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage” (IASP, 1979). The recognition of pain has received most scientific study, perhaps because of the historical importance of the veterinary profession in the study of animal welfare and its obvious association with physical lesions. A variety of techniques have been proposed in the scientific literature for the assessment of pain in the horse based on behavioural and physiological measures e.g. the assessment of activity budgets pre and post surgery (Price et al., 2003), response to analgesia (Dyson 2002), and median frequency within electro-encephalogram recordings (Murrell et al., 2003), but these are generally restricted to use within a specific context. More general measures, such as indicators of sympathetic nervous system activity tend to be non-specific to suffering, unvalidated and / or contradictory. Nonetheless, the ethology of pain is probably worthy of further attention.

It is also important to appreciate that pain is probably not the only aversive feeling experienced by horses. Dawkins (1990) argues that suffering consists of a “a wide range of emotional states that occur when an animal is blocked from carrying out actions that are biologically mandated, normally reduce harm or risk to life or concern reproduction.” This stance has spawned a wealth of work designed to assess the needs of animals in order to determine which are biologically mandated. Simple preference tests may tell us what an animal prefers but they do not tell us if an animal is suffering if it is deprived of the preferred choice. I may prefer Bordeaux wines to Champagnes but I can be happy with either! So scientists have developed techniques where they have started to look at the price an animal is willing to pay for a given commodity. In this way we can have a clearer idea of what is really important to an animal. However, whilst there is nothing to theoretically stop such work being done in the horse, the cost of building the experimental apparatus and housing the number of animals necessary for the time required to obtain sound data has to date largely prevented such work in the horse; although Houpt’s group at Cornell (Lee et al 2001) has conducted preliminary studies to assess the strength of a horse’s motivation for exercise and companionship when confined for 23 hours in the day. A higher price was paid for companionship over exercise and this reinforces much work by our own group which suggests that social isolation is one of the primary problems with many modern housing systems (see Mills and Clarke, 2002 for a review). There is undoubtedly a need for more work in this field and we can only hope that those who have the potential to fund it recognise its importance so we can objectively assess the welfare of the horse in a variety of contexts.

In short this publication is an essential resource for all those who work both directly and indirectly with horses.

References:


International Association for the Study of Pain (IASP) (1979). Pain terms: a list with definitions and notes on usage.


Equine Welfare Issues in the United States: An Introduction

by Carolyn L. Stull, PhD

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Horses are found on every continent in the world; perhaps this is an indication of the enormous utilitarian value which this versatile species has given to societies throughout the world. As these societies developed in different ways, it was perhaps inevitable that differing views of how horses should be treated also developed. Over the centuries, people of diverse cultural and ethnic origins have settled in the United States and have utilized horses for transportation, food, draft power, sport, pleasure, and companionship. The history of equine welfare and legislation in the U.S. is a reflection of the traditional views and background of its diverse society.

The U.S. was the first country in the world to provide legal protection of farm animals, which included the horse. In 1641, the Massachusetts Bay colony drafted a law which forbade cruelty to farm animals, including horses. In another Liberty, it was stated that rest, feed, and water should be provided to animals led, driven or ridden. States have historically addressed differing equine welfare issues through legislation. For example, California’s statute of 1905 forbade the docking of horses’ tails, which was defined as the removal of the lower portion of the tail for the purposes of shortening it. The docking of tails was primarily practiced on driving horses to prevent the entanglement of the tail with the driving lines. However, it remains today to be a prohibited practice in California, but not in other neighboring states. A variety of state legislation has been enacted over the years and currently enforces activities such as the prohibition of the poling of jumping horses, the misuse of specific medications in sport horses, and the elimination of some rodeo events in both traditional and Mexican-style rodeos.

Horses pulling wagons, carts coaches and city streetcars were used for transportation in the early nineteenth century. New York City was especially overcrowded with carriages, and the first horse drawn street railway was developed in 1832. These streetcars often were packed with too many passengers, and horses had to endure slippery, icy and salted streets during the bitter cold winter months. Henry Bergh became concerned about the overcrowding of the streetcars and the filthy housing conditions of these horses. There were numerous newspaper editorials ridiculing Henry Bergh as he stopped these streetcars and refused to allow traffic to continue until excess passengers disembarked. Henry Bergh continued with his crusade against the abuse of horses by developing legislation in the state of New York to charter the American Society for the Prevention of Cruelty to Animals. The Society focused mainly on the abuses of horses, but was also concerned with vivisection, transport of animals, and slaughterhouse conditions. Many branch Societies were established in surrounding towns and cities, and the successful expansion of the mission and goals of the ASPCA to other states was inevitable. Perhaps, Henry Bergh was one of the most influential leaders in addressing the welfare concerns of horses through model law enforcement and educational programs, in addition to founding the ASPCA.

The largest federal program in scope and impact on equine welfare in the last 50 years came with the legislation entitled “Horse Protection Act” of 1970. The Act prohibits the use of irritating or blistering agents, lacerations, or injected substances to the limbs of competitive horses for the purposes of altering its gait. Congress stated in the Act that “soring of horses is cruel and inhumane.” The legislation was mainly directed at the high-stepping gait of the Tennessee

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Walking Horse breed, but covers all competitive and sales events. The United States Department of Agriculture’s (USDA) veterinary medical officers inspect competitive events. Violators can be prosecuted as a felony offense. Identification of violations and the inspection process of the horses has continually undergone revisions since the initiation of the Act; some of these changes were the result of applicable scientific research and technology advances.

Horses in the U.S. have been used to produce meat products for human consumption, with most of the consumption outside its borders. Consumption of horse meat was popular after World War II, especially in Europe where beef was scarce and old or lame horses were processed for affordable meat products. Today, horsemeat is a high-priced meat delicacy in some European countries. Prior to 1979, horses were shipped live to Europe on ocean barges, often with high mortality rates and other unsuitable conditions. This practice is now prohibited (Provision of Export Administration Act) and thus the foreign companies invested in slaughter facilities in countries such as Canada and U.S. where there are large horse populations to supply their customers. Since there were a limited number of these facilities, often horses would have to endure long distances and difficult conditions by road transport to reach a facility. In the early 1990’s, there was public concern about the transport and handling conditions of horses to slaughter facilities which prompted the development of federal regulations. Research by several universities was conducted to establish scientific data on different aspects of transport. Using this published data, the USDA Animal Plant and Health Inspection Service established (February, 2002) specific regulations on the safe and humane commercial transportation of equines to slaughter (9 CFR Parts 70 and 88). The regulations cover maximum transit times and prohibit “unfit” horses from being loaded, the use of “pot-belly” trailers after 2006, and the use of electrical prods. Recently, Canada and Mexico have agreed (USDA, Veterinary Services Memorandum 555.18) to perform similar inspections at their slaughter facilities for horses originating in the U.S. to ensure the safe and humane transport of horses internationally.

The predominate role of horses in the U.S. has progressed over the last century from their utilization as livestock, draft or agricultural animals to recreational, sport, or as companion animals. This progression has paralleled the change in cultural values associated with the welfare of horses. Society today expects a similar standard of care for horses that are offered to family pets, such as dogs and cats. Neglected or abused horses are reportable to animal control agencies at the local community level in most areas in the U.S. Animal control and protection service in the U.S. consists of both non-profit and governmental organizations. The limited resources of most animal control agencies are primarily utilized for control of dogs and cats in their community. Their facilities and expertise for horses varies from no services to extensive shelter facilities designed for horses with trained personnel.

Although, most horses are afforded a high standard of care during their lifetime, some horses may experience lack of feed, water or care due to economic restraints, limited knowledge necessary to adequately care for the horse, or the loss of the horse’s ability to perform its intended role for the owner (e.g., lameness, old age). Most neglect and abuse cases can be resolved through owner education. However, the care and rehabilitation of the neglected, abused, or unwanted horses can be extensive in resources, funding, and time. Older horses may be limited in their physical abilities or health to be a promising candidate for relocating to another home following rehabilitation. Additionally, neglected horses may pose a disease risk to the general equine population and the public’s health by hosting or transmitting diseases. Educational programs using existing resources on subjects such as appropriate housing for climatic conditions, feeding requirements, health, acceptable training methods, manure management, transportation conditions, and humane euthanasia should be developed and accessible to all facets of society. These programs should convey to the owner the responsibilities in caring for horses which are socially acceptable and ensure the welfare of the individual horse.

The future of equine welfare will certainly be reflective of the progression of cultural values in society, the advancements from scientific research, future global trade and health issues, and the continued development of local, state and federal regulations and legislations. The emerging issues may include transportation regulations extended to pleasure and sport horses, minimum exercise requirements for confined horses, permitting equine facilities for environmental, welfare, and safety standards, and the development of feasible long-term venues to care for unwanted or aged horses at the local community level. Informational resources, such as this publication by Animal Welfare Information Center, will be invaluable for protecting or enhancing the welfare of the horse through many venues including the development of extensive educational programs, implementation of progressive or innovative management techniques, or by the enforcement of regulations or legislation.
Anesthesia and Analgesia


NAL Call Number: SF601.C66
Descriptors: horses, injectable anesthetics, anesthesia, neuroleptics, drug combinations, xylazine, ketamine, diazepam, morphine, detomidine, propofol, dosage, depth of anesthesia, guaifenesin, butorphanol, tiletamine, zolazepam, anesthesia induction.


NAL Call Number: SF967.M3N49 1991
Descriptors: horses, euthanasia, embutramide detection, gas chromatography, mass spectrometry.
Language of Text: English with a Dutch summary.


NAL Call Number: 41.8 Am3A
Descriptors: horses, effects of anesthesia, drug combinations.


NAL Call Number: SF1.I4
Descriptors: horses, anesthetic, castration procedure, diazepam, lidocaine.


NAL Call Number: SF601.C24
Descriptors: anesthetic, shock wave therapy, musculoskeletal disorder, treatment.
Language of Text: English with a French summary.


NAL Call Number: 41.8 Am3A
Descriptors: horses, medetomidine, xylazine, administration effects.

Pruritus following a single administration of 100 \( \text{[mu]}g \text{ kg}^{-1} \) of preservative-free morphine sulphate given via an extradural catheter was seen in a 580 kg horse. The catheter was placed in the first intercoccygeal space. Focal irritation, represented by both local alopecia over the left gluteal muscles and serum exudation, occurred 4-8 hours after injection. This was attributed to the extradural morphine administration.

Descriptors: anesthesia administration, pruritus, preservative free morphine sulphate, alopecia, serum exudation.


Descriptors: handling horses, analgesics, restraint technique, safety, twitches, tying.


Descriptors: anesthesia, drug delivery systems, injection, metacarpus, peripheral nerves, synovial sheaths, techniques, horses.


Descriptors: horses, morphine, analgesia, hemodynamic variables, blood gas values, surgery.


Descriptors: horses, nerve block, surgery, peripheral nervous system, anesthesia, cranial nerve.

Language of Text: Romanian with English and French summaries.


Descriptors: horses, non steroidal anti-inflammatory, anesthesia, anesthetic techniques, dentistry, neuroleptics.


Descriptors: navicular disease, therapy, corticosteroids, sodium hyaluronate, amikacin.


Descriptors: horses, anesthesia, epidural injections, dosage variation, xylazine, lidocaine.

Language of Text: Portuguese with an English summary.

De Rossi, R., B.F.B. Sampaio, J.V. Varela, and A.L. Junqueira (2004). *Perineal analgesia and haemodynamic effects of the epidural administration of meperidine or hyperbaric bupivacaine in conscious horses*. *Canadian

**Descriptors:** adverse effects, anesthesia, animal welfare, postoperative care, postoperative complications, recovery, trauma, horses.


**Abstract:** Lidocaine is a local anesthetic drug that is widely used in equine medicine. It has the advantage of giving good local anesthesia and a longer duration of action than procaine. Although approved for use in horses in training by the American Association of Equine Practitioners (AAEP), lidocaine is also an Association of Racing Commissioners International (ARCI) Class 2 drug and its detection in forensic samples can result in significant penalties. Lidocaine was observed as a monoprotonated ion at m/z 235 by ESI+ MS/MS (electrospray ionization-positive ion mode) analysis. The base peak ion at m/z 86, representing the postulated methylenediethylamino fragment [CH2N(CH2CH3)2]+, was characteristic of lidocaine and 3-hydroxylidocaine in both ESI+ and EI (electron impact-positive ion mode) mass spectrometry. In addition, we identified an ion at m/z 427 as the principal parent ion of the ion at m/z 86, consistent with the presence of a protonated analog of 3-hydroxylicoidcaine-glucuronide. We also sought to establish post-administration ELISA-based 'detection times' for lidocaine and lidocaine-related compounds in urine following single subcutaneous injections of various doses (10, 40, 400 mg). Our findings suggest relatively long ELISA based 'detection times' for lidocaine following higher doses of this drug.

**Descriptors:** local anesthetics, lidocaine, detection in racehorses, post-administration ELISA-based detection times, urine samples, drug dosage.


**Online:** http://www.blackwell-synergy.com/servlet/useragent?func=showIssues&code=vaa

**Descriptors:** horses, anesthesia, isoflurane, measurement error, gas analysis, short wavelength analysis, analytical techniques.


**Descriptors:** racing horses, anesthetics, mepivacaine, urine, drug detection, local anesthetics.


**NAL Call Number:** SF601.A46

**Descriptors:** anesthesia, premedication, sedation techniques, stress management, ketamine, xylazine, butorphanol, diazepam, succinylcholine, detomine, morphine, acepromazine.


Online: http://pub.epsilon.slu.se/854/

Descriptors: horses, anesthesia, musculoskeletal system, post-anaesthetic myopathy, muscle metabolism, microdialysis, laser doppler flowmetry, microdialysis, muscle biopsy.

Notes: Thesis.


NAL Call Number: 41.8 Z5

Descriptors: horses, inhalation anesthesia, effects of anesthesia, muscle metabolism, analysis techniques.


Descriptors: horses, anesthesia, cardiovascular variables, muscle perfusion, propofol-ketamine, detomidine, muscular metabolic response, respiratory function.

Notes: Equine Special Issue.


Online: http://www.aaeep.org

Descriptors: etiology, anesthesia, anesthetics, analgesics, diagnosis, diagnostic techniques, injection, joint diseases, lameness, ligaments, local anesthetics, reviews, spine, horses.


NAL Call Number: 41.8 Am3A

Descriptors: horses, analgesia, pain management, navicular disease, phenylbutazone, flunixin meglumine, analysis techniques.


Descriptors: horses, anesthesia, anesthetic procedure, acepromazine, anesthesia, anesthetics, chloral hydrate, phenothiazines.

Language of Text: Spanish with an English summary.


NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To compare intraoperative pain responses following intraovarian versus mesovarian injection of lidocaine in mares undergoing laparoscopic ovariectomy. DESIGN: Randomized controlled trial. ANIMALS: 15 mares between 4 and 20 years old. PROCEDURE: Standard bilateral laparoscopic ovariectomy was performed. Prior to manipulation of the ovary, 2% lidocaine (10 mL) was injected into the ovary and saline (0.9% NaCl) solution (10 mL) was injected into the mesovarium on 1 side, with saline solution (10 mL) injected
into the ovary and 2% lidocaine (10 mL) injected into the mesovarium on the other side. Presence (yes vs no) and severity (visual analogue scale) of pain were scored at 5 times (grasping of the ovary, dissection of the mesosalpinx, tightening of the first loop ligature, tightening of the second loop ligature, and transection of the ovarian pedicle) by 2 individuals blinded to treatment and each other's observations. RESULTS: During 4 of the 5 observation periods, significantly fewer mares had signs of pain following mesovarian injection of lidocaine, and during 2 of the 5 observation periods, visual analogue scale score was significantly lower. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggest that mesovarian injection of lidocaine is associated with significantly lower pain responses, compared with intraovarian injection, in horses undergoing laparoscopic ovarioectomy.

Descriptors: local administration and dosage of anesthetics, horses, lidocaine, ovarioectomy, pain, intraoperative care, laparoscopy methods, mesovarian injection compared to intraovarian injection of lidocaine.


NAL Call Number: 41.8 P882

Descriptors: horses, anesthesia, anesthetic injection, ketamine, xylazine, guaifenesin, risks.
Language of Text: German with an English summary.


NAL Call Number: 41.8 Am3A

Descriptors: horses, anesthesia, sedation, romifidine, intravenous administration, intramuscular administration, sublingual administration.


Abstract: The objective of this study was to assess 2 noninvasive methods of measuring cardiac output (CO) in neonatal foals by comparing results to that of the lithium-dilution method. Ten neonatal foals were anesthetized and CO was manipulated by varying the depth of anesthesia and infusion of dobutamine. Concurrent CO measurements were obtained by lithium dilution (reference method), partial carbon dioxide (CO2) rebreathing, volumetric echocardiography (cubic, Teichholz, Bullet, area-length, and single and biplane modified Simpson formulas), and transthoracic Doppler echocardiography. Thirty pairs of lithium-dilution/noninvasive CO measurements were taken from the 10 foals. For each method, relative bias was calculated as a percentage of the average CO. Lithium determinations of CO ranged between 3.09 and 11.1 L/min (mean +/- SD = 6.39 +/- 2.1 L/min), resulting in cardiac indices ranging between 79.0 and 209 mL/kg/min (mean +/- SD = 131 +/- 35.9 mL/kg/min). Relative bias of Doppler echocardiography significantly increased (P < .05), whereas that of partial CO2 rebreathing significantly decreased (P = .03) with increasing CO. Other methods were not influenced by the level of CO. Among methods not influenced by the level of CO, relative bias of the Bullet method (-4.2 +/- 20.9%; limits of agreement -45.2 to 36.7%) was significantly lower (P < .05) than that of each of the other noninvasive methods evaluated. Volumetric echocardiography using the Bullet method provides an accurate and noninvasive estimate of CO in anesthetized neonatal foals and warrants investigation in critically ill conscious foals.

Descriptors: anesthesia, neonatal foals, noninvasive cardiac output measurement methods, methodology comparison, lithium dilution, partial carbon dioxide rebreathing, volumetric echocardiography, transthoracic Doppler echocardiography.


NAL Call Number: SF911.V43

Descriptors: horses, conduction anesthesia, perineum, ketamine, evaluation, dosage, blood pressure, blood gases, pain, dosage effects.

Online: http://www.aaep.org

Descriptors: analgesics, butorphanol, catheters, detomidine, drug delivery systems, neuroleptics, surgery, syringes, techniques, horses.


NAL Call Number: SF601.I4

Descriptors: horses, veterinary procedures, castration, postoperative management, complications, surgical equipment, surgical methods.


NAL Call Number: 41.8 Am3A

Descriptors: horses, anesthesia, right ventricular relaxation rate, isoflurane, halothane, calcium gluconate, evaluation techniques.


NAL Call Number: 41.8 Am3A

Descriptors: anesthesia, intratesticular administration, lidocaine, cardiovascular system, cremaster muscle tension, castration, inhalation anesthesia.


NAL Call Number: SF951.E67

Descriptors: horses, surgical procedures, standing surgery, anesthesia, sedatives, detomidine.


NAL Call Number: 41.8 P882

Descriptors: horses, general anesthesia, xylazine, romifidine, detomidine, muscle relaxants, guaifenesin, ketamine, alpha-2-agonists, foals, propofol, diazepam.

Language of Text: German with an English summary.


NAL Call Number: SF951.E62

Descriptors: horses, caudal epidural anesthesia, epidural injections, anesthesia procedure, injection quantity determination method.


NAL Call Number: 22.5 N928

Descriptors: horses, anesthesia techniques, cardiovascular system, electrocardiograms.


HongBin, W. and W.e.a. YunHe (1995). *[Studies on the influence of different anaesthetic methods on the arterial

Descriptors: horses, anesthetic techniques, blood chemistry, blood gases, acid base status.


NAL Call Number: SF604.V485

Descriptors: horses, foals, general anesthesia, isoflurane, intravenous administration, dosage determination.

Language of Text: Spanish.


NAL Call Number: SF601.A46

Descriptors: injectable anesthetics, anesthesia.


Descriptors: horses, analgesia, anesthesia, acupuncture, surgical procedures.


Descriptors: limb bones, bone spavin, joint diseases, Fenestration technique, anesthesia, musculoskeletal system, surgery, horses.

Language of Text: English with German and English summaries.

Kariman, A., S.M. Ghamsari, and M.R. Mokhber Dezfooli (2001). Evaluation of analgesia induced by epidural administration of medetomidine in horses. Journal of the Faculty of Veterinary Medicine, University of Tehran 56(2): 49-51. ISSN: 1022-646X.

Descriptors: horses, analgesics, sedatives, muscle relaxants, medetomidine, caudal epidural agents.

Language of Text: Persian with an English summary.


Descriptors: anesthesia, respiratory system, jet-type respirators, cardiovascular system, chemicophysical properties.

Language of Text: Japanese.


NAL Call Number: SF955.E6

Abstract: Six horses were randomly assigned to receive either furosemide (F) (0.5 mg/kg i.v.) or an equivalent volume of saline (S) i.v., 4 h prior to treadmill exercise. Horses were instrumented to enable measurement of heart rate (HR), systolic (SAP), mean (MAP), and diastolic (DAP) carotid arterial pressures, pulmonary artery pressure (PAP), central venous pressure (CVP), pulmonary arterial temperature (TEMP), blood gases, and cardiac output (CO). Plasma (PV) and blood volumes (BV) were measured using 2 injections of Evan's Blue dye. Baseline parameters were recorded while the horse stood quietly. Horses were then administered F or S. Four hours later, they were warmed up for 3 min at 4 m/s and then exercised to the point of fatigue at 115% VO₂max. Horses were anaesthetised immediately following exercise by administration of detomidine (0.04 mg/kg bwt i.v.) followed 5 min later by tiletamine-zolazepam (1.25 mg/kg bwt i.v.). After transporting the horse...
to a recovery stall, anaesthesia was maintained with isoflurane in 100% O2. Data were analysed using a 2-way ANOVA with repeated measures with post hoc differences identified using the Student-Newman-Keul's procedure. Exercise was associated with increases in HR, SAP, MAP, DAP, PAP, CVP, TEMP, PCV, and BV, and decreases in PV, pH, arterial bicarbonate and base excess. Anaesthesia was associated with marked hypercapnia, a decrease in HR following detomidine administration, and persistent pulmonary hypertension despite carotid arterial pressure which returned to baseline. No effects attributable to F were identified at any time during the study.

Descriptors: anesthesia, blood volume, diuretics, furosemide, heart drug interactions, horse physiology, physical conditioning, acid base equilibrium, blood pressure, exercise test, muscle fatigue, respiration.

NAL Call Number: 41.8 Am3A
Descriptors: metabolism, nervous system, neural coordination, pharmacology, local anesthetic drug, mepivacaine, pharmacokinetics.

NAL Call Number: 41.8 Am3A
Abstract: OBJECTIVE: To identify hind limb and pelvic kinematic variables that change in trotting horses after induced lameness of the distal intertarsal and tarsometatarsal joints and after subsequent intra-articular administration of anesthetic. ANIMALS: 8 clinically normal adult horses. PROCEDURE: Kinematic measurements were made before and after transient endotoxin-induced lameness of the distal intertarsal and tarsometatarsal joints and after intra-articular administration of anesthetic. Fourteen displacement and joint angle (metatarsophalangeal [fetlock] and tarsal joints) measurements were made on the right hind limb, sacrum, and the right and left tubera coxae. Kinematic measurements were compared by general linear models, using a repeated measures ANOVA. Post hoc multiple comparisons between treatments were evaluated with a Fisher least squared difference test at alpha = 0.05. RESULTS: After lameness induction, fetlock and tarsal joint extension during stance decreased, fetlock joint flexion and hoof height during swing increased, limb protraction decreased, and vertical excursion of the tubera coxae became more asymmetric. After intra-articular administration of anesthetic, limb protraction returned to the degree seen before lameness, and vertical excursion of the tubera coxae became more symmetric. CONCLUSIONS AND CLINICAL RELEVANCE: Increased length of hind limb protraction and symmetry of tubera coxae vertical excursion are sensitive indicators of improvement in tarsal joint lameness. When evaluating changes in tarsal joint lameness, evaluating the horse from the side (to assess limb protraction) is as important as evaluating from the rear (to assess pelvic symmetry).
Descriptors: anesthetics administration and dosage, horse diseases physiopathology, joints physiopathology, lameness, animal physiopathology, biomechanics, gait, hindlimb physiopathology, horses, injections, intra articular veterinary, reproducibility of results, video recording.

Lansdowne, J.L., C.L. Kerr, L.P. Boure, and S.G. Pearce (2005). Epidural migration of new methylene blue in 0.9% sodium chloride solution or 2% mepivacaine solution following injection into the first intercoccygeal space in foal cadavers and anesthetized foals undergoing laparoscopy. American Journal of Veterinary Research 66(8): 1324-1329. ISSN: 0002-9645.
NAL Call Number: 41.8 Am3A
Abstract: OBJECTIVE: To determine the relationship between epidural cranial migration and injectate volume of an isotonic solution containing dye in laterally recumbent foal cadavers and evaluate the cranial migration and dermatome analgesia of an epidural dye solution during conditions of laparoscopy in foals. ANIMALS: 19 foal cadavers and 8 pony foals. PROCEDURES: Foal cadavers received an epidural injection of dye solution (0.05, 0.1, 0.15, or 0.2 mL/kg) containing 1.2 mg of new methylene blue (NMB)/mL of saline (0.9% NaCl) solution. Length of the dye column and number of intervertebral spaces cranial and caudal to the injection site were measured. Anesthetized foals received an epidural injection of dye solution (0.2 mL/kg) containing saline
solution or 2% mepivacaine. Foals were placed in a 100 head-down position, and pneumoperitoneum was induced. Dermatome analgesia was determined by use of a described electrical stimulus technique. Foals were euthanatized, and length of the dye column was measured. RESULTS: Epidural cranial migration of dye solution in foal cadavers increased with increasing volume injected. No significant difference was found in epidural cranial migration of a dye solution (0.2 mL/kg) between anesthetized foals undergoing conditions of laparoscopy and foal cadavers in lateral recumbency. Further cranial migration of the dye column occurred than indicated by dermatome analgesia. CONCLUSIONS AND CLINICAL RELEVANCE: Epidural cranial migration increases with volume of injectate. On the basis of dermatome analgesia, an epidural injection of 2% mepivacaine (0.2 mL/kg) alone provides analgesia up to at least the caudal thoracic dermatome and could permit caudal laparoscopic surgical procedures in foals.

Descriptors: foals, epidural cranial migration analgesia, injectable analgesia, laparoscopy, dermatome analgesia, mepivacaine, volume of injectate.


Descriptors: adverse effects, analgesics, butorphanol, conduction anesthesia, drug combinations, fentanyl, methadone, morphine, opioids, pain, pharmacokinetics, horses.

Language of Text: German with an English summary.


Descriptors: horses, anesthesia recovery, inhaled anesthetics, assisted standing equipment, sling systems.

Language of Text: German with an English summary.


NAL Call Number: 41.8 Am3

Descriptors: horses, cardiovascular system, dimethyl sulfoxide, halothane anesthesia, respiratory rate, heart rate, arterial blood pressure variability.


Online: [http://dx.doi.org/10.1111/j.1467-2995.2005.00247.x](http://dx.doi.org/10.1111/j.1467-2995.2005.00247.x)

NAL Call Number: SF914.V47

Abstract: To determine the effect of morphine administration on commonly monitored cardio-respiratory variables and recovery quality in horses undergoing anaesthesia and surgery. Prospective, randomized clinical study. Thirty-eight Thoroughbred horses, 32 geldings and six mares, 3-13 years old, weighing 411-600 kg. A standard anaesthetic technique was used. Twenty minutes after induction of anaesthesia horses received 0.1 mg kg\(^{-1}\) (0.1 m) or 0.2 mg kg\(^{-1}\) (0.2 m) morphine by intravenous injection. A control group did not receive morphine. Heart rate, respiratory rate (fr), mean arterial pressure (MAP) and blood gases were measured before morphine administration and every 10 minutes thereafter. Horses were positioned for 35 minutes in right lateral recumbency for tension palatoplasty by cautery and were then moved into dorsal recumbency for additional intraluminal surgery comprising one or more of aryepiglottic fold resection, subepiglottal mucosal resection, ventriculectomy and cordectomy. A subjective recovery score from 0 (worst) to 5 (best) was assigned by a single observer who was unaware of treatment group. Two-way repeated measures anova, one-way anova, Kruskal-Wallis test, Mann-Whitney test, Pearson and Spearman correlation coefficients, and chi-squared tests were used to analyse the data where appropriate. Arterial partial pressure of oxygen (PaO2) decreased significantly over time and was significantly lower in horses that received morphine. One horse in the control group and two horses in each of the morphine groups had a PaO2 <13 kPa. No other
significant cardiopulmonary effects were detected. Recovery scores [median (range)] were higher in morphine recipients: 4 (2-5) in 0.1 m, 4 (3-5) in 0.2 m compared with 3 (2-4) in the control group. The lower PaO2 in morphine recipients did not appear to be of clinical significance in healthy horses because the number of horses with a low PaO2 was similar between groups. The quality of recovery was significantly better in morphine recipients. These results indicate that morphine may be considered for use in clinical cases although further work is required to assess the analgesic properties of the drug in this species.

Descriptors: anesthesia, morphine administration, blood gases, cardio-respiratory variables, recovery quality, blood pressure, clinical trials, surgical procedures.


NAL Call Number: SF955.E6

Abstract: Detomidine was given to 11 pregnant mares at 3 week intervals during the last trimester of pregnancy. Maternal and fetal electrocardiographs were recorded and fetal activity studied by transabdominal ultrasonography, before and 2 h (2, 5, 10, 20, 30, 60, 90 and 120 min) after injection. After parturition, the foals were examined and weighed. Maternal and fetal heart rate showed an initial decline after detomidine administration. Maternal heart rate in the treatment group were lower already 2 min after injection, but a reduction in fetal heart was first seen 5 min after detomidine administration. Mean fetal heart rate at 2 min after detomidine injection was 109, 104, 95 and 90 beats/min, whereas at 5 min it was 80, 76, 72 and 66 beats/min in the 2nd, 3rd, 4th and 5th examination session, respectively. The heart rates did not revert to the control values during follow-up. Decline and recovery patterns were quite similar during all examination sessions. The mares exhibited conductive disturbances 2 min after detomidine administration, but fetal heart rhythm remained regular. Fetal activity was decreased at 5 min but had reverted to control values about 90 min after detomidine administration. Administration of detomidine (0.015 mg/kg) to healthy pregnant mares at 3 week intervals during the last trimester had no measurable detrimental effects on the outcome of pregnancy.

Descriptors: detomidine, pregnant mares, fetal activity recordings, maternal and fetal heart rate, effect of detomidine on outcome of pregnancy.


NAL Call Number: SF604.P82

Descriptors: horses, anesthesia, injection methods.


Descriptors: horses, anesthesia, intravenous administration, clinical techniques.


NAL Call Number: 41.8 Am3A

Descriptors: horses, anesthesia, ketamine, propofol, intravenous injection, infusion, heart rate, blood pressure, cardiac output, body temperature, respiration rate, blood gases, hematocrit, blood protein, pharmacokinetics, dosage effects.


Descriptors: horses, Standardbreds, anesthesia maintenance techniques, romifidine, ketamine, cardiovascular system, respiratory system.


NAL Call Number: SF951.E62

NAL Call Number: 41.8 Am3
Descriptors: morphine, epidural administration, patellar ligament, analgesics, injections, horses.


NAL Call Number: SF955.E6
Abstract: REASONS FOR PERFORMING STUDY: Although fentanyl has been reported to cause CNS excitation in horses, a transdermal therapeutic system (TTS) containing this mu agonist has recently been used empirically in equine medicine to treat moderate to severe pain. A better understanding of the disposition of fentanyl following transdermal administration would facilitate the clinical use of TTS fentanyl to obtain analgesia in horses. OBJECTIVES: To determine the pharmacokinetics of fentanyl following i.v. and TTS patch administration in healthy, mature horses and to evaluate the tolerance of horses to TTS fentanyl administration. METHODS: The pharmacokinetics of fentanyl in serum were assessed following a single i.v. dose, a single TTS dose, and multiple TTS doses in 6 healthy horses. Physical examinations, haematology and serum biochemistry analyses during transdermal fentanyl application were then performed to determine tolerance of continuous fentanyl administration. RESULTS: Fentanyl was very rapidly and completely absorbed following a single TTS dose. Mean serum fentanyl concentrations consistent with analgesia in other species were reached by 1 h and maintained until 32 h after patch application. Similar steady state serum concentrations were obtained when multiple doses of TTS fentanyl were administered every 48 or 72 h over 8 or 9 days, with less fluctuation in serum concentrations during the 48 h dosing interval. Three horses exhibited brief (< 12 h) episodes of increased body temperature; however, transdermal fentanyl administrations were not associated with other significant changes in haematology and biochemistry panels or physical examination findings. CONCLUSIONS AND POTENTIAL RELEVANCE: Although the pharmacodynamics of fentanyl have not been investigated fully in horses, transdermally-administered fentanyl exhibited a favourable pharmacokinetic profile without clinically relevant side effects and may be a useful analgesic in equine patients.
Descriptors: analgesics, fentanyl, horse metabolism, drug dose response relationship, routes of administration, intravenous injections, pain, administration of fentanyl transdermally.


NAL Call Number: 41.8 V641
Descriptors: horses, general anesthesia, surgical procedures, risk factors, complications.

Descriptors: horses, anesthesia, neurotropic drugs, drugs, Equidae, mammals, Perissodactyla.
Language of Text: Serbian with English and Serbian summaries.

Online: http://www.ovma.org
Descriptors: horses, anesthesia, guaifenesin, intravenous injection techniques, ketamine, xylazine.


**Abstract:** OBJECTIVES: To evaluate the analgesic, physiologic, and behavioral effects of the epidural administration of tiletamine/zolazepam in horses. STUDY DESIGN: Prospective, double-blind, randomized experimental study. ANIMALS: Five adult, healthy horses aged 10-16 years and weighing (mean +/- SD) 400 +/- 98 kg. METHODS: The horses were sedated with 1.0 mg kg(-1) intravenous (IV) xylazine, and an epidural catheter was placed into the first intercoccygeal intervertebral space. After a 48-hour resting period, epidural tiletamine/zolazepam, 0.5 mg kg(-1) (treatment I) or 1.0 mg kg(-1) (treatment II), diluted up to 5 mL in sterile water, was administered with a 1-week interval between the treatments. Heart rate, respiratory rate, arterial blood pressure, and sedation were evaluated. In order to evaluate the respiratory effects, blood from the carotid artery was withdrawn at time 0 (baseline), and then after 60 and 240 minutes. Analgesia was evaluated by applying a noxious stimulus with blunt-tipped forceps on the perineal region, and graded as complete, moderate, or absent. Data were collected before tiletamine/zolazepam administration and at 15-minute intervals for 120 minutes, and 4 hours after tiletamine/zolazepam administration. Data were analyzed with anova and Bonferroni's test with p < 0.05. RESULTS: The results showed no significant difference between treatments in cardiovascular and respiratory measurements. Sedation was observed with both doses, and it was significantly different from baseline at 60, 75, and 90 minutes in treatment II. Moderate analgesia and locomotor ataxia were observed with both the treatments. CONCLUSIONS AND CLINICAL RELEVANCE: The results suggest that caudal epidural 0.5 and 1.0 mg kg(-1) tiletamine/zolazepam increases the threshold to pressure stimulation in the perineal region in horses. The use of epidural tiletamine/zolazepam could be indicated for short-term moderate epidural analgesia. There are no studies examining spinal toxicity of Telazol, and further studies are necessary before recommending clinical use of this technique.

**Descriptors:** epidural anesthesia, horses, blood pressure, drug effects on heart rate and respiration, behavioral and physiologic effects, tiletamine administration and dosage, zolazepam administration and dosage, Telazol.
Feed and water were withheld for 24 hours followed by i.v. administration of saline (0.9% NaCl) solution, xylazine (0.5 or 1.0 mg/kg), or detomidine (0.03 mg/kg). Horses were treated 4 times, each time with a different protocol. Following treatment, urine and blood samples were obtained at 15, 30, 60, 120, and 180 minutes. Blood samples were analyzed for PCV and serum concentrations of total plasma solids, sodium, and potassium. Urine samples were analyzed for pH and concentrations of glucose, proteins, sodium, and potassium.

RESULTS: Baseline (before treatment) urine flow was 0.30 +/- 0.03 mL/kg/h and did not significantly change after treatment with saline solution and low-dose xylazine but transiently increased by 1 hour after treatment with high-dose xylazine or detomidine. Total urine output at 2 hours following treatment was 312 +/- 101 mL versus 4,845 +/- 272 mL for saline solution and detomidine, respectively. Absolute values of urine concentrations of sodium and potassium also variably increased following xylazine and detomidine administration.

CONCLUSIONS AND CLINICAL RELEVANCE: Xylazine and detomidine administration in horses deprived of feed and water causes transient increases in urine volume and loss of sodium and potassium. Increase in urine flow is directly related to dose and type of alpha2-adrenergic receptor agonist. Dehydration in horses may be exacerbated by concurrent administration of alpha2-adrenergic receptor agonists.

Descriptors: adrenergic agonists, food and water deprivation, horses, xylazine, deomindine, urine characteristics, alpha2-adrenergic receptor agonist, dehydration.


NAL Call Number: SF277.J37

Descriptors: horses, general anesthesia, cardiovascular system, respiratory system, thiopental sodium, respiratory frequency, arterial pressure, tidal volume, heart rate, stroke volume, cardiac output.


Descriptors: horses, veterinary facilities, veterinary examination methods, veterinary treatment methods.

Language of Text: Japanese.


NAL Call Number: SF957.P7

Descriptors: horses, opioids, pain management, analgesic administration, lidocaine, morphine, butorphanol, veterinary procedures.


Descriptors: horses, anesthesia, anesthetics, ketamine, drugs, Equidae, mammals, neurotropic drugs, Perissodactyla.


NAL Call Number: 41.8 Am3A

Descriptors: bute, phenylbutazone, analgesics, high performance liquid chromatography, neurotropic drugs, oxyphenbutazone, extraction, blood serum.

Abstract: Digital semiological anesthesia in horses: Technique and elements of interpretation. Semiological anesthesia of the pes is used during examinations for lameness in horses. Recent research data on the distal digital, distal interphalangeal articular, and podotrochlear intrathecal nerve blocks indicate that they are less than specific when considered in isolation. They should be used in combination to localize pain in the pes. A positive response to anesthesia of the distal interphalangeal articulation could also indicate that the source of the pain was in the podotrochlear apparatus or the dorsal part of the sole. Podotrochlear anesthesia also anesthetizes the dorsal part of the sole and, later, the distal interphalangeal joint. Distal digital anesthesia affects a large palmar area of the hoof and extends dorsally. Overall, basic research provides little support for the practical uses of semiological blocks.

Descriptors: horses, lameness examination techniques, pain location methods, digital semiological anesthesia.

Language of Text: French.


Descriptors: metamizole, nonsteroidal anti-inflammatory drug, antipyretic, horses, drug residue detection, analgesics, urine analysis, gas chromatography, mass spectrometry.


NAL Call Number: SF601.C66

Descriptors: foals, anesthetic techniques, veterinary procedures.


Abstract: OBJECTIVE: The objective of this review was to describe the methodology and limitations of techniques that have been used to measure skeletal muscle blood flow in anaesthetized horses. DATABASE USED: Pubmed, personal files. CONCLUSION: Numerous techniques have been used in horses to study skeletal muscle blood flow during anaesthesia and after the administration of vasoactive agents. Of the available techniques, blood flow measurements are limited to either microvascular flow (radioactive xenon, laser Doppler flowmetry) or total blood flow (radioactive microspheres, electromagnetic flowmetry, Doppler ultrasonography). None of the techniques currently available are able to fully assess the distribution of flow throughout the skeletal muscle. Near-infrared spectroscopy has the potential to assess the adequacy of oxygenation within muscles; however, this technique is not without limitations, and more work is required to assess its suitability. Understanding the limitations of these techniques is an important prerequisite to the critical evaluation of the information currently available on the effects of anaesthesia and vasoactive drugs on skeletal muscle blood flow.

Descriptors: anesthetized horses, skeletal muscle blood flow measurement techniques, methodology, microvascular flow, total blood flow, radioactive xenon, laser Doppler flowmetry, radioactive microspheres, electromagnetic flowmetry, Doppler ultrasonography.


Descriptors: horses, lengthy operative procedures, anesthetic management, controlled ventilation, cardiovascular system.


NAL Call Number: 41.8 M463

Descriptors: horses, anesthesiology, anesthetic maintenance, anesthetic protocol.

Language of Text: Polish.

**Descriptors:** horses, anesthesia, anesthetics, muscle relaxants, injection, blood plasma, HPLC, analytical methods, application methods, blood, chromatography, drugs, Equidae, mammals, neurotropic drugs, Perissodactyla.

**Language of Text:** Italian with an English summary.


**NAL Call Number:** SF605.N672

**Descriptors:** horses, anesthesia.


**NAL Call Number:** DISS F1995162

**Descriptors:** horses, anesthesiology, comparison anesthesia induction methods, romifidine, ketamine, diazepam.

**Language of Text:** German with an English summary.

**Notes:** Thesis.


**NAL Call Number:** SF957.P7

**Descriptors:** anesthesia, castration, ketamine, detomidine, horses.

**Language of Text:** French with an English summary.


**NAL Call Number:** 41.8 Am3A

**Abstract:** OBJECTIVE: To determine an infusion rate of butorphanol tartrate in horses that would maintain therapeutic plasma drug concentrations while minimizing development of adverse behavioral and gastrointestinal tract effects. ANIMALS: 10 healthy adult horses. PROCEDURE: Plasma butorphanol concentrations were determined by use of high-performance liquid chromatography following administration of butorphanol by single IV injection (0.1 to 0.13 mg/kg of body weight) or continuous IV infusion (loading dose, 17.8 microg/kg; infusion dosage, 23.7 microg/kg/h for 24 hours). Pharmacokinetic variables were calculated, and changes in physical examination data, gastrointestinal tract transit time, and behavior were determined over time. RESULTS: A single IV injection of butorphanol was associated with adverse behavioral and gastrointestinal tract effects including ataxia, decreased borborygmi, and decreased defecation. Elimination half-life of butorphanol was brief (44.37 minutes). Adverse gastrointestinal tract effects were less apparent during continuous 24-hour infusion of butorphanol at a dosage that resulted in a mean plasma concentration of 29 ng/ml, compared with effects after a single IV injection. No adverse behavioral effects were observed during or after continuous infusion. CONCLUSIONS AND CLINICAL RELEVANCE: Continuous IV infusion of butorphanol for 24 hours maintained plasma butorphanol concentrations within a range associated with analgesia. Adverse behavioral and gastrointestinal tract effects were minimized during infusion, compared with a single injection of butorphanol. Continuous infusion of butorphanol may be a useful treatment to induce analgesia in horses.

**Descriptors:** analgesics, drug effects on behavior, butorphanol, gastrointestinal transit, horse metabolism, high pressure liquid chromatography, cross over studies, half life, intravenous infusions and injections.

NAL Call Number: 41.8 D482

Abstract: Diazepam is used in veterinary medicine as sedative and pre-anaesthetic agent. This publication describes the plasma-concentration time curve for diazepam and its metabolite in horses suffering from colic after intravenous application as pre-anaesthetic agent. Elimination half-life (t1/2 beta) after a dose of 0.05-0.08 mg/kg (30-50 mg Diazepam per horse) was 7.5 to 13.2 h. Total clearance (Cltot) between 1.86 and 3.44 ml/min/kg was detected and apparent volume of distribution in steady state (Vdiss) was 1.98 to 2.25 l/kg. Diazepam was still found in serum after 24 h. The metabolite oxazepam could be found in plasma. Its elimination half-life was 14-16.5 hours.

Descriptors: diazepam, sedative, pre-anesthesia, use of diazepam in horses with colic, elimination half-life, metabolic clearance rate, horses.

Language of Text: German with an English summary.


Descriptors: horses, castration, anesthesia, xylazine, pain management, local analgesia.


NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To determine the analgesic, hemodynamic, and respiratory effects induced by caudal epidural administration of meperidine hydrochloride in mares. ANIMALS: 7 healthy mares. Procedure: Each mare received meperidine (5%; 0.8 mg/kg of body weight) or saline (0.9% NaCl) solution via caudal epidural injection on 2 occasions. At least 2 weeks elapsed between treatments. Degree of analgesia in response to noxious electrical, thermal, and skin and muscle prick stimuli was determined before and for 5 hours after treatment. In addition, cardiovascular and respiratory variables were measured and degree of sedation (head position) and ataxia (pelvic limb position) evaluated. RESULTS: Caudal epidural administration of meperidine induced bilateral analgesia extending from the coccygeal to S1 dermatomes in standing mares; degree of sedation and ataxia was minimal. Mean (+/- SD) onset of analgesia was 12 +/- 4 minutes after meperidine administration, and duration of analgesia ranged from 240 minutes to the entire 300-minute testing period. Heart and respiratory rates, rectal temperature, arterial blood pressures, Hct, PaO2, PaCO2, pH, total solids and bicarbonate concentrations, and base excess were not significantly different from baseline values after caudal epidural administration of either meperidine or saline solution. CONCLUSIONS AND CLINICAL RELEVANCE: Caudal epidural administration of meperidine induced prolonged perineal analgesia in healthy mares. Degree of sedation and ataxia was minimal, and adverse cardiorespiratory effects were not detected. Meperidine may be a useful agent for induction of caudal epidural analgesia in mares undergoing prolonged diagnostic, obstetric, or surgical procedures in the anal and perineal regions.

Descriptors: meperidine hydrochloride, respiratory effects, caudal epidural administration, mares, analgesia, hemodynamic effects, induction of prolonged perineal analgesia, meperidine.


NAL Call Number: 41.8 Am3A

Descriptors: mares, yohimbine, intravenous injection, narcotic antagonists, detomidine, conduction anesthesia, drug effects, pain, cardiovascular system, respiratory system, position.


**Descriptors:** horses, cardiovascular system, leukoencephalomalacia, fumosin B1, neurologic disease, toxins, neurotoxicity, hepatotoxicity.


**Descriptors:** horses, anesthesia, ketamine, subcutaneous injections, effects of dosage variation.

Language of Text: Portuguese with an English summary.


**Abstract:** OBJECTIVE: To investigate effects of isoflurane at approximately the minimum alveolar concentration (MAC) on the nociceptive withdrawal reflex (NWR) of the forelimb of ponies as a method for quantifying anesthetic potency. ANIMALS: 7 healthy adult Shetland ponies. PROCEDURE: Individual MAC (iMAC) for isoflurane was determined for each pony. Then, effects of isoflurane administered at 0.85, 0.95, and 1.05 iMAC on the NWR were assessed. At each concentration, the NWR threshold was defined electromyographically for the common digital extensor and deltoid muscles by stimulating the digital nerve; additional electrical stimulations (3, 5, 10, 20, 30, and 40 mA) were delivered, and the evoked activity was recorded and analyzed. After the end of anesthesia, the NWR threshold was assessed in standing ponies. RESULTS: Mean +/- SD MAC of isoflurane was 1.0 +/- 0.2%. The NWR thresholds for both muscles increased significantly in a concentration-dependent manner during anesthesia, whereas they decreased in awake ponies. Significantly higher thresholds were found for the deltoid muscle, compared with thresholds for the common digital extensor muscle, in anesthetized ponies. At each iMAC tested, amplitudes of the reflex responses from both muscles increased as stimulus intensities increased from 3 to 40 mA. A concentration-dependent depression of evoked reflexes with reduction in slopes of the stimulus-response functions was detected. CONCLUSIONS AND CLINICAL RELEVANCE: Anesthetic-induced changes in sensory-motor processing in ponies anesthetized with isoflurane at concentrations of approximately 1.0 MAC can be detected by assessment of NWR. This method will permit comparison of effects of inhaled anesthetics or anesthetic combinations on spinal processing in equids.

**Descriptors:** anesthesia, isoflurane, minimum alveolar concentration, nocicetive withdrawal reflex, anesthetic potency, dosage effects, electric stimulation.


**Descriptors:** horses, infusion anesthesia, inhalation anesthesia alternatives, guaifenesin, ketamine, xylazine.

Language of Text: German with an English summary.


**Descriptors:** mares, xylazine, detomidine, conduction anesthesia, pain, drug effects, cardiovascular system, respiratory system, head, limbs, position.

**Descriptors**: horses, clinical techniques, navicular disease, pain management, ultrasonography.

**NAL Call Number**: SF601.I4


**Descriptors**: horses, conduction anesthesia, morphine, detomidine, drug combinations, catheters, adverse effects, safety.


**Descriptors**: horses, anesthesia, methodology.


**Descriptors**: horses, anesthesia, neuroleptics.


**Abstract**: BACKGROUND: Fentanyl decreases the minimum alveolar concentration (MAC) of inhaled anaesthetics and has been used clinically to reduce the requirements of other anaesthetic drugs in humans and small animals. We hypothesized that i.v. fentanyl would decrease the MAC of isoflurane in horses in a dose-dependent manner. METHODS: Following determination of baseline MAC of isoflurane, fentanyl was administered i.v. to target plasma concentrations of 1, 8 and 16 ng ml(-1). Each horse was randomly assigned two of three target concentrations administered in ascending order. Loading and infusion doses for each horse were determined from previously derived individual pharmacokinetic values. Isoflurane MAC determination began 45 min after fentanyl administration at each target fentanyl concentration. Venous blood was collected at fixed intervals during the infusion for measurement of plasma fentanyl concentrations. RESULTS: Mean actual fentanyl plasma concentrations were 0 (baseline), and 0.72 (sd 0.26), 8.43 (3.22), and 13.31 (6.66) ng ml(-1) for the target concentrations of 1, 8 and 16 ng ml(-1), respectively. The corresponding isoflurane MAC values were a baseline of 1.57 (0.23), and 1.51 (0.24), 1.41 (0.23) and 1.37 (0.09)%, respectively. The fentanyl concentrations of 0.72 and 8.43 ng ml(-1) did not significantly alter the MAC of isoflurane, but an 18 (7)% ISO-MAC reduction was observed at the 13.31 ng ml(-1) concentration. CONCLUSIONS: These results cautiously encourage further study of fentanyl as an opioid anaesthetic adjunct to inhalant anaesthesia in horses.

**Descriptors**: inhaled anesthetics, dose requirements, fentanyl, minimum alveolar concentration, isoflurane.


**Descriptors**: veterinary procedures, anesthesia, monitoring techniques.


**Descriptors**: veterinary procedures, anesthesia, monitoring techniques.
topical application of 0.5% proparacaine to the cornea. Ultrasonic pachymetry was used to measure central, mid-peripheral, and peripheral corneal thickness (CT) in all 4 quadrants of both eyes of 25 horses. All measurements were repeated after auriculopalpebral nerve block, sedation by IV administration of xylazine, or combination of nerve block and sedation. Mean IOP after topical anesthesia of the cornea was 20.6 +/- 4.7 mm of Hg for the left eye and 20.35 +/- 3.7 mm of Hg for the right eye. Mean central CT was 793.2 +/- 42.3 micrometers. The peripheral part of the cornea was significantly (P < 0.05) thicker, on average, than the central part of the cornea. Auriculopalpebral nerve block had no significant effect on IOP or CT. Intravenous administration of xylazine resulted in a significant (P < 0.05) decrease in IOP, but had no effect on CT.

Descriptors: horses, cornea, thickness, eyes, internal pressure, peripheral nerves, local anesthetics, xylazine, intravenous injection, mepivacaine-hydrochloride.

NAL Call Number: SF601.A46
Descriptors: effect of anesthesia on horses, anesthetics, drugs, neurotropic drugs, veterinary medicine.

NAL Call Number: SF911.V43
Descriptors: horses, hemodynamics, anesthesia, surgery, endotoxins, cardiovascular system, respiratory system, disease models, Escherichia coli, colic.

NAL Call Number: 41.8 Am3
Descriptors: inhalation anesthesia, intravenous anesthesia, methods of providing anesthetics, cats, dogs, horses, questionnaires, veterinary medicine, private practice veterinarians.

NAL Call Number: 41.8 Am3A
Descriptors: horses, atropine, preanesthetic medication, detomidine, halothane, blood pressure, anesthesia, heart rate, carbon dioxide, blood gases, adverse effects.

NAL Call Number: SF955.E6
Descriptors: horses, colic, surgical procedures, anesthesia, analgesia, data entry systems.

NAL Call Number: 41.8 Am3
Descriptors: horses, detomidine, conduction anesthesia, complications, dosage, recovery, halothane, case reports.

NAL Call Number: SF951.V47
Descriptors: horses, performance, pain management, acupuncture, musculoskeletal system, therapy coordination.
Behavior


**Descriptors:** horses, resting behavior, effects of bedding material on lying behavior, used bedding, sun dried bedding.


**Descriptors:** aggression, analgesics, animal behavior, anxiety, assessment, biological indicators, castration, catecholamines, colic, corticoids, depression, head, heart rate, hooves, hormone secretion, lameness, limbs, posture, reviews, stress grading, teeth, vocalization, pain, donkeys, horses.


**Descriptors:** horses, weanlings, behavior, effect of climate on behavior, effect of circadian rythym on behavior, loose housing.


**Descriptors:** horses, stable vices, abnormal behavior, risk factors for behavioral disorders.


**Descriptors:** horse welfare, stereotypic behavior, crib-biting, plasma cortisol concreteion, hear rate, stress response.


**Descriptors:** horses, behavioral disorders, stable vices, stereotypic behavior.

**Language of Text:** German with English, French and Italian summaries.

NAL Call Number: SF604.C13

Descriptors: horses, castration, sexual behavior, aggressive behavior, animal husbandry methods, behavior, gonadectomy, sterilization, surgical operations.


NAL Call Number: SF957.P7

Descriptors: horses, behavioral disorders, correction, symptomatology.


NAL Call Number: SF84.A56

Descriptors: horses, mares, foals, behavior patterns.

Language of Text: Polish with an English summary.


NAL Call Number: SF1.A56

Descriptors: horses, feeding preference, nutrient content.


NAL Call Number: QL750.A6

Descriptors: fear responses, behavioral responses, heart rate, stallions, food rewards, test arena, presentation of novel stimuli.


NAL Call Number: QL750.A6

Descriptors: horses, stallions, social interaction, behavior, aggressive behavior.


NAL Call Number: QL750.A6

Descriptors: horses, stallions, Przewalski's horse, social behavior, domestic management.


Descriptors: equine welfare, management practices, body condition score, stereotypic behavior, vices.


NAL Call Number: QL750.A6

Descriptors: horses, learning, behavior patterns, feeding preferences.

Descriptors: horses, heart rate, spectral density, sex, age, breed, variations.


Online: http://www.sciencedirect.com/science/article/B6T9B-4DXSRG5-1/2/f7cf94936a7a352db78ce1cc8df936c
NAL Call Number: SF1.L5

Descriptors: behavioral adaptation to environmental challenges, abnormal behavior, stable vices, horses, stereotypic behavior, adaptive responses.


NAL Call Number: QL750.A6

Descriptors: feeding frequency, stereotyped behavior, feed concentrates.


NAL Call Number: QL750.A6

Descriptors: horses, stable vices, weaving, abnormal behavior, housing, housing design.


NAL Call Number: SF285.3.W43 2002

Descriptors: horses, behavior, housing, stable vices, abnormal behavior, nutrition, animal welfare.


NAL Call Number: SF281.D66 2005

Descriptors: horses, mares, foals, behavior, maternal behavior.


NAL Call Number: QL750.A6

Descriptors: Mexican subsistence agriculture, horses, donkeys, mules, working animals, harnesses, Mexico, animal welfare.


Descriptors: horses, cattle, feeding behavior, telemetry, Ethosys system.

**Descriptors:** feral horses, domestication, compulsive behavior, behavioral disorders, confinement.


**Descriptors:** horses, digestive disorders, nervous system diseases, animal diseases, feeding habits, behavior, behavior, disorders, functional disorders, organic diseases, grass-sickness, dysautonomia.


**Descriptors:** horse behavior, behavioral abnormalities, anxious behavior, performance horses, mental health, stable vices.


**Descriptors:** herbivores, behavior, social behavior, grazing, feeding patterns.

**Language of Text:** French with an English summary.


**Descriptors:** stable vices, horses, behavioral disorders, abnormal behavior, aggressive behavior, normal equine behavior, behavioral treatments.


**Descriptors:** horses, behavior, housing systems, loose housing, group housing, age variation, breed variation, social hierarchy, animal welfare.

**Language of Text:** German with an English summary.


**Descriptors:** horses under saddle, behavior, stress, fear, pheromones, Equine Appeasing Pheromone behavior, fear reactions, heart rate.


**Descriptors:** horses, behavior, meal frequency, roughage.

NAL Call Number: 41.8 T445
Descriptors: horses, animal welfare, behavior, stress, outdoor housing systems, pasture, paddock, fencing.
Language of Text: German.

Descriptors: behavior, housing systems, confinement, isolation, individual housing, salivary cortisol concentration, behavioral indices, heart rate.

NAL Call Number: SF601.V484
Descriptors: horses, behavior, nutrition, veterinary medicine, dietary supplements, stress, calming methods.

NAL Call Number: QL750.A6
Descriptors: foals, weaning, animal housing, stalls, group size, paddocks, animal behavior, androstanes, feces composition, physical activity, rest, abnormal behavior, animal welfare, group housing.
Notes: In the special issue: Equine Behavior edited K. Houpt and R. Rudman.

NAL Call Number: SF756.7.I57 1996
Descriptors: horses, behavior, enrichment, animal welfare.
Notes: Abstract of a poster presented at the meeting.

Descriptors: foals, mares, human-horse relationship, mare-foal influence, effects of handling, behavior.

NAL Call Number: 49 J82
Descriptors: horses, foals, Thoroughbreds, weaning stress, pasture, hay, concentrates, effects of diet, weaning, plasma ascorbate concentration, serum cortisol, adrenocorticotropic hormone, behavior.

NAL Call Number: 49 J82
Descriptors: dietary fats, tractibility of horses, behavioral observations, pedometer, reactivity, reduction in activity and reactivity of horses.

NAL Call Number: QL750.A6
Descriptors: draught horse welfare, harness injuries due to improper fit, traction efficiency, Middle East.

NAL Call Number: SF291.E66 1997
Descriptors: horses, stallions, behavior, behavioral challenges, agression, mating behavior.

NAL Call Number: SF281.J352004
Descriptors: horses, behavior, horsemanship, development of behavior problems, behavioral solutions, natural behavior.

NAL Call Number: QL750.A6
Descriptors: horses, temperament, training of animals, foals, handling, tameness, feral herds, age differences, heart rate, sex differences, sires.

NAL Call Number: SF951.J65
Descriptors: stallions, oral administration, sexual behavior, aggressive behavior, semen characters, liveweight, testes, size, body condition, spermatozoa, abnormalities, sexual reproduction, sex hormones.

NAL Call Number: SF955.E6
Descriptors: behavior, diet, virginiamycin, horses, supplements, abnormal behavior, hay, concentrates, fermentation, medicated feed, acidosis, antibiotics, behavior, disorders, feeds, metabolic disorders, roughage.

Descriptors: grazing behavior, seasonal variation, effect of snowfall, feed intake, feed digestibility.

Descriptors: horses, social behavior, communication between animals, behavior, dominance.

NAL Call Number: SF756.7.S58 2001
Online: http://www.aap.org
Descriptors: abnormal behavior, aggression, animal behavior, equipment, techniques, vices, horses.

Online: http://www.sciencedirect.com/science/article/B6T48-4GCXJG1-1/2/d81b8c1aecd95a3906770d2e2b5caf25
NAL Call Number: QL750.A6
Descriptors: domestic animal welfare, behavior problems, behavior therapy, clinical ethology, behavior practitioners.

Online: http://springerlink.metapress.com/link.asp?id=105357
NAL Call Number: QL750.J68
Descriptors: ponies, Shetland ponies, donkeys, foraging behavior, lactation, pregnancy, grazing preference.

Descriptors: horses, foal development, effects of handling, behavior, imprinting, weaning, Welsh, neonatal handling, effects on manageability and fear, duration of handling effects.

Descriptors: horses, stable vices, abnormal behavior, stress, stereotypic behavior, aggressive behavior, mating behavior.
Language of Text: German.

NAL Call Number: 41.8 V644
Descriptors: abnormal behavior, therapy, vices, animal behavior, horses.
Language of Text: Hungarian.

NAL Call Number: SF281.L42 1998
Descriptors: therapy, horse behavior, abnormal behavior, stable vices, horse psychopathology, headshaking, cribbing, stereotypic behavior, aggression, abnormal sexual behavior, psychotropic drugs, prevention of behavior problems.
Language of Text: German.


Descriptors: horses, performance, behavior, resting behavior, abnormal behavior, stable vices, stress, stereotypic behavior.

Language of Text: Spanish.


NAL Call Number: SF756.7.I57 1996

Descriptors: horses, abnormal behavior, age, breed differences.

Notes: Abstract of a paper presented.


Descriptors: horses, coprophagia, foals, feeding preferences, feces, behavior, excreta, feeding habits, horses, young animals, learning.


ISSN: 0263-841X.

NAL Call Number: SF601.I4

Descriptors: horses, stable vices, abnormal behavior, animal welfare, literature reviews.


NAL Call Number: QL750.E82

Descriptors: horses, goats, deer, sheep, pigs, literature reviews, social behavior.

Language of Text: Italian.


NAL Call Number: QL750.A6

Descriptors: horses, stable vices, weaving, stereotypic behavior, environmental enrichment, management practices, social isolation, animal welfare.


NAL Call Number: 41.8 V641

Descriptors: horses, stereotypic behavior, stable vices, performance, management practices, isolation, surveys, animal welfare.


NAL Call Number: SF957.P7

Descriptors: horses, mares, breeding, estrous cycle, behavior, endocrine system.


NAL Call Number: SF281.M33 2003
Descriptors: horses, behavior, management practices, stereotypic behavior, ethogram.

Descriptors: ethogram, equine behavior, stable vices, management practices, stereotypic behavior, behavioral treatments, prevention of abnormal behavior, handbook for horse owners.

NAL Call Number: QL750.A6
Descriptors: play behavior, horses, ethogram, ponies, zebras, donkeys, Przewalski horses.

Descriptors: free-ranging horses, horse behavior, management, training of horses, stable vices, perception, learning, social behavior and communication, feeding and ingestive behavior, handling and transportation.

Descriptors: horses, behavior, stable vices, performance, stereotypic behavior, housing, environmental factors, management practices, animal welfare.

NAL Call Number: SF955.E6
Descriptors: horses, racehorses, Thoroughbreds, animal behavior, abnormal behavior, risk, animal husbandry, stables, surveys, statistical analysis, stereotypic behavior.

NAL Call Number: 41.8 V641
Descriptors: horses, vices, incidence, endurance, time, stables, dressage horses, event horses.

NAL Call Number: SF281.D66 2005

NAL Call Number: QL750.A6
Descriptors: equine memory, object permanence, feed goal, choice tests, recall abilities, effects of reinforcement delays during training.

NAL Call Number: SF951.J65
Descriptors: horses, pasture, grazing, behavior, Strongylus vulgaris, parasite predisposition.

NAL Call Number: 41.8 K67
Descriptors: horses, cats, dogs, birds, abnormal behavior, vices, aggressive behavior, stereotypic behavior, cribbing, self mutilation.
Language of Text: German with an English summary.

NAL Call Number: SF951.J65
Descriptors: horses, restraint of animals, immobilization, veterinary equipment, animal behavior, twitches.

Descriptors: horses, behavior correction, abnormal behavior, vices.
Language of Text: English with an Italian summary.

NAL Call Number: SF1.A56
Descriptors: horses, abnormal behavior, stable vices, weaving, animal welfare, housing conditions, environmental enrichment.

NAL Call Number: SF281.D66 2005
Descriptors: rider-horse relationships, equine communication, sexual behavior of horses, mare-foal interactions, learning capabilities, repetitive movement problems, feral behavior, domestication, environmental influence, social behavior, play behavior, animal welfare, stable vices.

Online: http://www.sciencedirect.com/science/article/B6T48-4F157KH-1/2/1046e0707d1d2c055c87e5f040115223
NAL Call Number: QL750.A6
Descriptors: weaning process, maternal behavior, foal behavior, gender differences, stress-coping strategies, salivary cortisol, heart rate, locomotor activities.

Online: http://www.sciencedirect.com/science/article/B6T48-4KF780J-1/2/683436b05453d125fda343c969987d51
NAL Call Number: QL750.A6
Descriptors: stabled horses, stallions, geldings, behavioral measures of eating satisfaction, operant response test, standing-sleep behavior, welfare indications.

NAL Call Number: SF951.J65
Descriptors: horses, behavior problems, vices, horse riding, incidence, traits, animal husbandry, training of animals, Italy, riding style, equestrian discipline.


Online: http://www.sciencedirect.com/science/article/B6T48-4JWMT0K-1/2/51a9f8f26578f14f30db1b2112018ed7


**Abstract:** The general consideration for welfare-related problems in animal husbandry has quickly grown up in the last period. Ethical reasons and the possible reduction in the different productions were the starting point for this interest. The aim of this work was to point out the present knowledge about neuroendocrine responses and main stressors for horses. Stress-related behavioural problems are also described.

**Descriptors:** horse behavior, stress, animal welfare, neuroendocrine responses to stress, abnormal behavior, dysregulation, melatonin, homeostasis, catecholamines, endorphins, vasopressin, prolactin, glucocorticoids, hormones, neurotransmitters.

**Language of Text:** Italian.


**Descriptors:** horses, abnormal behavior, management practices, stress, stress indicators, potassium.

**Language of Text:** Italian with an English summary.


**Descriptors:** horses, foraging enrichment, behavior, management practices, animal welfare.


**Descriptors:** horses, mares, behavior, behavioral variation, dominant behavior.


**Online:** [http://www.sciencedirect.com/science/article/B6T48-4JG5F5S-1/2/e46b8ab917f6d16f95d8890f12f8bce4](http://www.sciencedirect.com/science/article/B6T48-4JG5F5S-1/2/e46b8ab917f6d16f95d8890f12f8bce4)

**Descriptors:** human-animal relationships, farmed animals, comparison and validation of tests, welfare, ruminants, pigs, poultry, fur animals, horses.


**Descriptors:** management systems, equine welfare, natural history of horses, effects of environment on behavior and welfare, sport horses, work horses, training.


**Descriptors:** horses, social behavior, stereotypic behavior, stable vices, communication, social dominance, hierarchy, herds, farm animals.


**Descriptors:** horses, stereotypic behavior, abnormal behavior, environmental factors, behavior correction.


**Descriptors:** horses, abnormal behavior, foraging, grazing, behavior patterns, enrichment, animal welfare, stables, stereotypies, enrichment devices.

**NAL Call Number:** SF1.L5  
**Descriptors:** horses, housing, training, social needs, feeding practices, effects of climate, grooming, environmental factors, handling, horse-man relationship, effects of incorrect management practices.


**NAL Call Number:** SF281.Z4513 2004  
**Descriptors:** horse behavior, training of horses, behavioral disorders, stereotypic behavior, prevention of behavior problems, behavioral treatment.


**NAL Call Number:** 49 AR23  
**Descriptors:** horses, loose housing systems, behavior, social rank, resting behavior.  
**Language of Text:** German with an English summary.

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**Behavior -- Web Resources**

**Havemeyer Equine Behavior Lab Home Page.**  
**Online:** http://www3.vet.upenn.edu/labs/equinebehavior/Index.html  
**Description:** Includes a list of equine behavior references and internet links as well as information on current research. Also listed are clinics and classes on equine behavior offered by the University of Pennsylvania.

**Horse Behavior Research.**  
**Online:** http://www.ag.auburn.edu/ansc/ResPrograms/horse.html  
**Description:** List of links to articles on horse behavior research in the areas of crib-biting, reactivity, and equine learning. Research is conducted at the Horse Unit of Auburn University.

**Horse Behaviour.**  
**Online:** http://vein.library.usyd.edu.au/links/horses.html#behaviour  
**Description:** Links to various short articles on aspects of equine behavior including stress, vices, travel and racehorse behavior.

**Pica in Horses.**  
**Online:** http://www.usask.ca/wcvm/herdmed/applied-ethology/behaviourproblems/pica.html  
**Description:** Causes, treatment, and prevention of pica --the consumption of non-food substances.

**Equine Behavior: Prey vs. Predator, Horse vs. Human.** *Evans, P.*  
**Online:** http://extension.usu.edu/files/publications/publication/Ag_Equine_2005-02.pdf  
**Description:** This page highlights the behavioral similarities of humans to predators and horses to prey and emphasizes the importance of these behavioral roles in the human-horse relationship. The author also explains how to use this predator-prey behavioral relationship in handling and training.

**Equine Vision and Its Effect on Behavior.** *Evans, P.*  
**Online:** http://extension.usu.edu/files/publications/publication/AG_Equine_2005-03.pdf  
**Description:** Describes equine eye anatomy, field of vision, visual processing in the brain, and the effect of head position on vision as a means to explain certain equine behaviors.
**Online:** [http://cru.cahe.wsu.edu/CEPublications/eb1657/eb1657.html](http://cru.cahe.wsu.edu/CEPublications/eb1657/eb1657.html)  
**Description:** Designed to assist individuals identify equine vices. Details the behavior, description, and cause of vices in six categories: fear, aggression, performance, metabolism, stall, and miscellaneous vices.

Training and Behavioural Rehabilitation in the Horse. *Waran, N. and R. Casey.*  
**Online:** [http://www3.vet.upenn.edu/labs/equinebehavior/hvnwkshp/hv02/waran.htm](http://www3.vet.upenn.edu/labs/equinebehavior/hvnwkshp/hv02/waran.htm)  
**Description:** Cause, diagnosis, and treatment of behavioural problems in the domestic horse.

Horses Publications: The Basics of Equine Behavior. *Williams, C.*  
**Online:** [http://www.rcre.rutgers.edu/pubs/publication.asp?pid=FS525](http://www.rcre.rutgers.edu/pubs/publication.asp?pid=FS525)  
**Description:** Fact sheet with equine behavior explanations. Includes survival traits, senses, social structure, communication, and vices.
Environmental Enrichment


**NAL Call Number:** QL750.A6

**Descriptors:** horses, stable vices, weaving, abnormal behavior, housing, housing design.


**NAL Call Number:** SF955.E6

**Abstract:** The restricted access to pasture experienced by many competition horses has been linked to the exhibition of stereotypic and redirected behaviour patterns. It has been suggested that racehorses provided with more than one source of forage are less likely to perform these patterns; however, the reasons for this are currently unclear. To investigate this in 4 replicated trials, up to 12 horses were introduced into each of 2 identical stables containing a single forage, or 6 forages for 5 min. To detect novelty effects, in the first and third trials the single forage was hay. In the second and fourth, it was the preferred forage from the preceding trial. Trials were videotaped and 12 mutually exclusive behaviour patterns compared. When hay was presented as the single forage (Trials 1 and 3), all recorded behaviour patterns were significantly different between stables; e.g. during Trial 3 in the 'Single' stable, horses looked over the stable door more frequently (P<0.001), moved for longer (P<0.001), foraged on straw bedding longer (P<0.001), and exhibited behaviour indicative of motivation to search for alternative resources (P<0.001) more frequently. When a previously preferred forage was presented as the single forage (Trials 2 and 4) behaviour was also significantly different between stables, e.g in Trial 4 horses looked out over the stable door more frequently (P<0.005) and foraged for longer in their straw bedding (P<0.005). Further study is required to determine whether these effects persist over longer periods. However, these trials indicate that enrichment of the stable environment through provision of multiple forages may have welfare benefits for horses, in reducing straw consumption and facilitating the expression of highly motivated foraging behaviour.

**Descriptors:** access to pasture, abnormal behavior, racehorses, provision of multiple forages, enrichment of stable environment, stereotyped behavior, animal feed, animal welfare, equine housing, videotape recording, animal welfare.


**NAL Call Number:** QL750.I67 1997

**Descriptors:** horses, behavior, animal welfare, racehorses, provision of multiple forages, enrichment of stable environment, stereotyped behavior, animal feed, animal welfare, equine housing, videotape recording, animal welfare.


Descriptors: horses, behavior, music, stress remedies, animal welfare.


Descriptors: horses, stable vices, weaving, stereotypic behavior, environmental enrichment, management practices, social isolation, animal welfare.


Descriptors: restricted forage diet, stereotypical behavior, gastric ulcers, colic, foraging enrichment, stabled horses, individual preferences, patch foraging behavior.


Descriptors: environmental enrichment, stabled horses, stereotypical behavior, foraging behavior, foraging device, Edinburgh Foodball, individually housed Standardbred horses.
Housing

NAL Call Number: 41.8 Am3
Descriptors: horses, horse housing, environmental contamination, Salmonella infection, disinfection procedure, bacteria management.

Descriptors: moxidectin, worming of horses, parasitoses, anthelmintics, grazing, restraint of animals, animal feeding, stabled versus pastured horses.
Language of Text: Spanish with English and Spanish summaries.
Notes: Thesis (Med Vet).

Descriptors: horses, horse housing, animal welfare, housing inspection.
Language of Text: German with an English summary.

NAL Call Number: SF601.J65
Descriptors: horses, foals, blood composition, oral supplement, iron deficiency, management practices.

NAL Call Number: SF285.3.B76 2003
Descriptors: horses, horses psychology, horse health, stable management.

NAL Call Number: SF285.3.B76 1996
Descriptors: horses, horses psychology, horses health, stables management.
Notes: Rev. ed. of Horse and Stable Management. 2nd ed. 1994.

Descriptors: animal health, animal housing, environmental temperature, humidity, lighting, microclimate, stables, ventilation, horses.


NAL Call Number: SF951.J65

Descriptors: horse housing systems, respiratory disease, mucosal inflammation, environmental factors.


Online: http://www.uspto.gov/patft/index.html

Descriptors: corral apparatus, adjustable confinement, attaches to horse trailer, variable corral size.


NAL Call Number: SF285.35.C37 1999

Descriptors: stables, horse trailers, dust control.


Descriptors: horses, housing, mites, geographical prevalence, Caloglyphus berlesei, Caloglyphus, Acari, Arachnida.

Language of Text: Spanish with an English summary.


Online: http://www.sciencedirect.com/science/article/B6T48-4H8FPHG-2/2/d6997d9871207de7b7499542de812139

NAL Call Number: QL750.A6

Descriptors: behavior frequency during turnout, grazing frequency, welfare implications, effect of housing on behavior.


NAL Call Number: TH4930.C58 1999

Descriptors: stables design and construction, barn remodeling for other uses, horses housing.


Descriptors: horses, housing, equipment.

Language of Text: Romanian.


NAL Call Number: 58.8 C164

Descriptors: animal housing, model systems, ventilation, filtration, dust control.
NAL Call Number: 58.8 C164
Descriptors: horses, housing, dust level, ventilation.

Descriptors: horses, housing, infection prevention, disinfection methods.

Descriptors: group housing systems, injury, risk factors, preventive measures, management practices, feeding methods, physiological requirements, welfare considerations.
Language of Text: German with an English summary.

NAL Call Number: LC45.4.J682
Descriptors: horse riding, horsemanship, animal injuries, health promotion, health insurance.

NAL Call Number: TH4930.H37 2004
Descriptors: animal housing design and construction, barns design and construction, multipurpose buildings design and construction.

NAL Call Number: SF285.H55 2005
Descriptors: horses, housing, small farms.

NAL Call Number: SF285.35.H56 2000
Descriptors: stable management, barn features, stalls, tack rooms, turnout areas, stable vices, prevention of behavioral problems, sanitation and pest control, hay, grain, feeding practices, water, safety, emergency preparedness.

NAL Call Number: 49 J82
Descriptors: horses, weanlings, bone mass, housing, confinement, exercise protocol, skeletal strength, diagnostic techniques.

NAL Call Number: SF955.E6
Descriptors: horses, Arabian horses, housing systems, bone mineral content, biochemical markers, bone metabolism, serum osteocalcin concentration, pastures, stalls.

**NAL Call Number:** SF955.E6

**Descriptors:** horses, yearlings, Arabian horses, pasture, stable, effect of housing on respiratory system, airway inflammation, evaluation techniques, pharyngeal lymphoid hyperplasia, guttural pouch inflammation, neutrophils, bronchoalveolar lavage fluid, soft palate displacement.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, feral, domesticated, anti-borna disease, epidemiological studies.


**Online:** http://www.ansinet.org/jbs

**Descriptors:** analysis, composition, dust, elements, particle size, particles, shape, stables, techniques, X radiation.


**NAL Call Number:** 41.8 M463

**Descriptors:** horses, *Parascaris equorum*, roundworms, management systems, housing systems, parasite prevention.

**Language of Text:** Polish.


**Descriptors:** horses, epidemiological studies, parasitology, pasture contents, seasonality of pasture, housing contamination.


**Descriptors:** animal husbandry, agriculture, nutrition, alfalfa hay, blood parameters, grass hay, animal feed, pasture grazing, stable feeding.


**Descriptors:** horses, foals, effects of stabling, disease control, *Rhodococcus equi*.

**Language of Text:** Portuguese with English and French summaries.


**Descriptors:** foals, hay, haylage, concentrates, drinking water, animal competition, extensive husbandry, animal feeding, animal husbandry methods, biological competition, extensive farming, farming systems, feeds, fermented products, horses, processed products, roughage, silage, water, young animals.

**Language of Text:** Swedish with English and Swedish summaries.

Descriptors: horses, behavior, body temperature, resting behavior, movement patterns.

NAL Call Number: 41.8 Am3A
Descriptors: horses, limb loading, effects of confinement, housing, environmental factors.

NAL Call Number: 421 B87
Descriptors: horses, Culicoides, Culicoides imicola, disease vectors, vector control, stables, fans, animal behavior, feeding habits, species differences, climatic factors, trapping, African horse sickness, protection, disease prevention, South Africa, entry behavior, exophily, endophily, vector exclusion.

NAL Call Number: SF951.E62
Descriptors: horses, bedding, management practices, housing, stall waste compost.

NAL Call Number: SF955.E6
Descriptors: air quality, airborne infection, disease transmission, farms, paddocks, pneumonia, risk factors, stables, temperate climate, ventilation, virulence, horses, Rhodococcus equi.

NAL Call Number: 450 M994
Descriptors: air microbiology, fungal spores, fungi, seasonal variation, animal housing, species diversity, Italy, horse stables.

NAL Call Number: 41.8 D482
Descriptors: horses, housing, animal welfare, environmental factors, stable construction to benefit animals.
Language of Text: German.

Descriptors: Sorghum arundinaceum, Avena sativa, farmyard manure, crop yield, soil chemicophysical properties, agricultural wastes, Avena, Gramineae, sorghum, wastes, yields.
Language of Text: Japanese.

**NAL Call Number:** 18 W96

**Descriptors:** mares, foals, animal housing, design, free range husbandry, animal welfare, loose housing system, young horse needs, pastures, farming systems, grazing lands.

**Language of Text:** German.


**NAL Call Number:** SF951.J65

**Descriptors:** horses, housing, stall floors, ammonia, methods to limit ammonia exposure.


**Online:** http://www.sciencedirect.com/science/article/B75GX-4J6W40S-52/ddbd00c2795d1e2762e87744f0229b

**NAL Call Number:** SF951.J65

**Descriptors:** lying behavior, sternal and lateral recumbency, rolling behavior, rotating behavior, effect of box size on resting behavior, equine welfare relevance.


**NAL Call Number:** 41.8 Au72

**Descriptors:** horses, effect of head elevation, bacterial contamination, respiratory system, equine lower respiratory tract, transportation, confinement.


**NAL Call Number:** 41.8 Au72

**Descriptors:** horses, procaine penicillin, dosage rate variation, dosage frequency variation, respiratory disease, bacterial contamination, effects of head elevation.


**NAL Call Number:** 41.8 C163

**Descriptors:** horses, housing, stabling, flooring types, bedding, dust levels, ammonia levels, shavings, horse health.

**Notes:** Meeting Information: 2001 Annual Meeting of the Canadian Society of Animal Science, Guelph, ON, Canada; July, 2001.


**Descriptors:** effect of housing, respiratory system, allergens, endotoxins, glucans, microorganisms, environmental risk factors, effect of ventilation.

**Language of Text:** Swedish.


**Descriptors:** horses, housing, stall contamination, bacteria, microbial flora, fungi, *Enterobacter agglomerans*, *Bacillus firmus*, *Proteus mirabilis*, *Penicillium granulosum*, *Aspergillus fumigatus*, relative humidity.

**Language of Text:** Spanish.


**NAL Call Number:** 41.8 Am3A

**Descriptors:** horses, housing, stable management, sodium bisulfate, ammonia concentration, manure, fly control.


**NAL Call Number:** SF951.J65

**Descriptors:** horses, effects of bedding type, bacteria, fungi, endotoxins.


**NAL Call Number:** SF951.V47

**Descriptors:** horses, facility management, disease control, risk factors.


**NAL Call Number:** 41.8 Am3

**Descriptors:** *Salmonella* spp, fecal shedding, equine facilities, facility management, grain or concentrate sampling.


**NAL Call Number:** aSF951.B56 1998

**Descriptors:** horses diseases, prevention, epidemiology, United States.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, management, silage, wood residues, straw, environmental control, pathogenesis, respiratory diseases, diet, litter for animals, hay, feed grasses, agricultural wastes, animal housing, crop residues, feed, fermented products, forest products, grasses, organic diseases, processed plant products, processed products,
roughage, wastes, wood products, wood shavings, remission, chronic obstructive pulmonary disease.


**NAL Call Number:** SF601.V484

**Descriptors:** horses, respiratory evaluation, blood gas analysis, chronic obstructive pulmonary disease, respiratory system, environmental factors, bedding, feed.


**Descriptors:** horses, management practices, feeding, housing, ventilation, social housing, animal welfare.

**Language of Text:** German with an English summary.


**NAL Call Number:** 49 J82

**Descriptors:** horses, bedding materials, management practices.

**Notes:** Meeting Information: 88th Annual Meeting of the American Society of Animal Science, Rapid City, South Dakota, USA; July 24-26, 1996.


**NAL Call Number:** TH4930.H67 2005

**Descriptors:** stables design and construction, horses housing, handbooks, manuals.


**NAL Call Number:** 41.8 V641

**Descriptors:** housing, respiratory system, respiratory inflammation, effect of environmental change, ethane, carbon monoxide, hydrogen peroxide.


**NAL Call Number:** 41.8 D482

**Descriptors:** horses, management practices, seasonal management, housing, animal welfare.

**Language of Text:** German with an English summary.

**Notes:** Special issue: *Animal Welfare.*


**NAL Call Number:** 41.8 T445

**Descriptors:** horses, group housing, animal welfare.

**Language of Text:** German with an English summary.

Housing -- Web Resources

Animal Housing Systems.
   Online: http://www.abe.psu.edu/extension/factsheets/g/
   Description: Multiple fact sheets on equine facility design and maintenance.

Horses - Housing.
   Online: http://www.omafra.gov.on.ca/english/livestock/horses/housing.html
   Description: Multiple fact sheets on pasture and stable construction and maintenance as well as pest control strategies and season specific housing management.

Horse Housing. Wright, B.
   Online: http://www.omafra.gov.on.ca/english/livestock/horses/facts/05-045.htm
   Description: Explains indoor and outdoor housing options with consideration for owner/handler convenience and efficient daily activity.

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Last updated: October 25, 2011
Law and Legislation

NAL Call Number: 41.8 P882
Descriptors: horse, law, veterinary inspection, sale of horses.
Language of Text: German with an English summary.

NAL Call Number: 41.8 P882
Descriptors: horse, law, veterinary inspection, sale of horses.
Language of Text: German with an English summary.

Descriptors: horse, legislation, veterinary inspection, sale of horses.
Language of Text: German.


**Abstract:** European Community (EC) legislation requires identification and registration of bovine, ovine, caprine and porcine animals. For intra-Community trade, bovine animals must be accompanied by a passport and the required health certificate, and identified by a tag on each ear. The principles of active identification of bovine animals (by ear tags) and of ovine, caprine and porcine animals (by ear tags or tattoos) are harmonised within the EC. International passports are issued and recognised only for registered Equidae. The life-number was introduced as an instrument to allow uninterrupted identification of Equidae using passports. The principles of issuing and recording such numbers have been outlined by the affected industries, but require official approval. Active identification of Equidae using electronic devices is not regulated by EC legislation, but research in livestock is underway.

Descriptors: European Union, international passports for equines, identification and registration of bovine, ovine, caprine and porcine animals, electronic identification of horses, animal identification systems.

NAL Call Number: 41.8 Am3
Descriptors: animal legislation, commercial sale and slaughter, free roaming horses, Wild Free Roaming Horses

**NAL Call Number:** 41.8 Am3  
**Descriptors:** animal identification systems, animal welfare, animal legislation, breeding, cattle, dogs, horses, meat, veterinary medicine.

**NAL Call Number:** 41.8 V641  
**Descriptors:** animal identification systems, European Union, transportation of horses, equine passports.

**NAL Call Number:** 41.8 V641  
**Descriptors:** animal welfare legislation, transportation legislation, animal welfare standards, cattle, drinking, eating, Great Britain, horses, sheep, swine.

**Abstract:** The injury of a horse's leg needed to be investigated to answer the question whether the fracture had been caused by an accident or by intentional manipulation. By toxicology and using scanning electron microscopy with an energy dispersive X-ray spectrometer (SEM-EDX) the suspicion obtained by morphology could be confirmed. Toxicologically a short term anaesthetic was found, and by EDX ferric oxide particles could be detected in the wound indicating that the injury was caused by a sharp pointed metallic instrument and not as stated by the owner by a wooden bar. As the result of the interdisciplinary investigation using modern techniques, there is no doubt that the owner attempted to fraudulently claim on an insurance policy.  
**Descriptors:** insurance fraud, hoof and leg injuries in horses, determination of accidental or intentional injury, forensic medicine, legal case.

**NAL Call Number:** SF604.A97  
**Descriptors:** horses, veterinary practice, legal liability.

**Descriptors:** horses, marking, fires, animal welfare, legislation, disasters, methods, cauterization.  
**Language of Text:** German.

**Descriptors:** consumer protection, legislation, horses.  
**Language of Text:** German.

**Descriptors:** diagnostic techniques, joint diseases, legislation, radiography, veterinary jurisprudence, veterinary services, horses.  
**Language of Text:** German.

Biagi, G., S. Nannipieri, and F. Signorini (1996). **Piano di controllo dell'arterite virale equina (AVE).** Aspetti

**NAL Call Number:** QL750.E82

**Descriptors:** horses, disease management, legislation, equine viral arteritis.

**Language of Text:** Italian.


**Descriptors:** horses, transport, animal welfare, legislation.

**Language of Text:** German with an English summary.

Boissevain, I. (2001). *Het is ook nooit goed! [It is never right! Veterinary disciplinary law].* *Tijdschrift Voor Diergeneeskunde* 126(12): 431.

**Descriptors:** legal liability, ownership legislation and jurisprudence, veterinarians, horse behavior, Netherlands.

**Language of Text:** Dutch.


**Descriptors:** legal liability, ownership legislation and jurisprudence, veterinarians, horse behavior, Netherlands.

**Language of Text:** Dutch.


**Descriptors:** doping, drug residues, drug therapy, drugs, pharmacodynamics, racehorses, regulations, urine, veterinarians, horses.

**Language of Text:** French with an English summary.


**NAL Call Number:** 41.8 Am3

**Descriptors:** horses, legal rights, veterinary practice, legislation, liability.


**NAL Call Number:** 41.8 T445

**Descriptors:** horses, bornavirus, BDV infection, amantadine, antigens.

**Language of Text:** German with an English summary.


**NAL Call Number:** SF604.P82 no. 183

**Descriptors:** horses, racehorses, veterinary prescriptions, drug therapy, law, legislation, seminar proceedings.


**Descriptors:** horses, law, horse auctions, certification process, sale regulations.

NAL Call Number: 41.8 D482

Abstract: Rodeo events have been criticised by animal welfare organisations as being adverse to animal protection, for years. This was the motive for TVT to put several of these criticised disciplines to evaluation in terms of animal protection aspects. For that purpose, various rodeo events were visited, and videotaped material of almost all events, which had taken place in Germany in 2003 and 2004, was evaluated. Rodeo events are subject to and 11, sec.1, No. 3d, German Animal Protection Act, which implies compulsory accreditation. In the scope of such events, causing any sort of pain and suffering (and 3 No. 6 German Animal Protection Act) is prohibited. A proof of the severity of the pain caused, is therefore no necessity. For the "critical" disciplines "Bare Back Riding" and "Saddle Bronc Riding" a so called "flank" is used. A flank is a leather strap, fastened to the sensitive parts of the horse skin, (around the flanks,) which is tightened to a maximum as soon as the horse is released from the starting box. Analysis show, that the strap has to be seen as the trigger for the wanted kow-tow. The different coping strategies shown by the animals prove that the leather strap is an apt instrument to cause pain and/or suffering (anxiety/fear/stress) in horses. Bull riding, instead, showed that the rider has to be seen primarily as the trigger for defence behaviour, here. In consideration of the current legal position and taking ethic principles into account, it seems appropriate to only authorise rodeo events under the condition of a flank strap ban. Bull riding should be banned in general.

Descriptors: animal welfare legislation, rodeos, animal protection movement, severity of pain during rodeo events, bareback riding, saddle bronc riding, bull riding, Germany.

Language of Text: German.


Descriptors: horses, stallions, castration, surgery, law, complications, etiology.

Language of Text: German with an English summary.


NAL Call Number: SF285.25.G56 2002

Descriptors: horse law and legislation in Great Britain, horse owners.


Descriptors: racehorses, saddle horses, legislation, regulations, European Union, drug therapy, doping, veterinary medicine, meat animals, domestic animals, Equidae, horses, illegal practices, international agreements, international organizations, international relations, mammals, Perissodactyla, therapy, useful animals, working animals.

Language of Text: Italian.


NAL Call Number: QL750.E82

Descriptors: saddle horses, racehorses, drug therapy, public health legislation, legal liability, residues, horse meat, veterinarians, registration, regulations, veterinary medicine, animal products, domestic animals, Equidae, horses, law, legislation, mammals, meat, occupations, Perissodactyla, therapy, useful animals, working animals.

Language of Text: Italian.

Descriptors: saddle horses, racehorses, drug therapy, public health legislation, legal liability, residues, horse meat, veterinarians, registration, regulations, veterinary medicine, animal welfare, health hazards, animal products, domestic animals, Equidae, horses, law, legislation, mammals, meat, occupations, Perissodactyla, therapy, useful animals, working animals.

Language of Text: Italian.


Descriptors: horses, trotters, law, legislation, animal welfare, harness, equipment compliance.

Language of Text: German with an English summary.


Descriptors: farm animals, horses, pigs, goats, cattle, law, legislation, veterinary procedures, breeding, artificial insemination.

Language of Text: Italian.


Descriptors: farm animals, animal welfare, law, legislation, veterinary history, dehorning, slaughter, castration, literature reviews, ethical management, housing, surgery, amputation, debeaking.

Language of Text: German with an English summary.


Descriptors: horses, laws, legislation, disease diagnosis, parasites, exports, imports, international trade.

Language of Text: German.


Descriptors: horses, sports, horse racing, cartel legislation, media marketing, breeders, performance, trade associations.

Language of Text: German.


Descriptors: horses, nutrition, medicinal plants, law, legislation, animal feed, feed supplementation.


Notes: Meeting Information: 9th International Symposium "Animal Science Days", Radenci, Slovenia; 3-5

**NAL Call Number:** HV4704.E84 1998

**Descriptors:** animal suffering, veterinary ethics, Farm Animal Welfare Council, commercial birds, farm animals, horses, pigs, laboratory animals, companion animals, animal perception, stress, psychological stress, laws and legislation, ethics.


**Descriptors:** horses, sale, law, legislation, veterinary examination, liability.

**Language of Text:** Italian.


**NAL Call Number:** 41.8 D482

**Descriptors:** livestock, laws, legislation, trade regulations.

**Language of Text:** German with an English summary.


**NAL Call Number:** 41.8 D482

**Abstract:** The German stock-trading law is a special statute that has been put into effect at the end of the last century (sections 482-492 BGB, i.e. civil code, and Kaiserliche Verordnung, i.e. imperial regulation). It promotes agricultural interests and contains guarantees which are out-of-date. This state had led to serious irritabilities with the general law of trade (sections 459-480 BGB). The difference in legal treatment of persons buying stock (i.e. equines, cattle, sheep and swine) or those buying other animals (e.g. dogs, cats, poultry) seems to be unsupportable any longer. For this reason the constitutional principle of equality in legal matters (section 3.1, German constitution) will be used and interpreted as a motivation for the importance to revise the antiquated stock-trading law.

**Descriptors:** revising stock trading laws, animal welfare legislation, cats, cattle, dogs, horses, poultry, sheep, swine, Germany.

**Language of Text:** German.


**NAL Call Number:** 41.8 Am3

**Descriptors:** horses, laws, legislation, horse slaughter prohibition, human consumption.


**NAL Call Number:** SF951.J65

**Descriptors:** horses, animal behavior.


**Descriptors:** horses, legislation, laws, European Union, veterinary medicine.

**Language of Text:** Italian.

for riding horses to comply with welfare legislation]. Tierärztliche Umschau 51(10): 624, 626-628. ISSN: 0049-3864.

NAL Call Number: 41.8 T445

Descriptors: horses, law, legislation, harnesses, animal welfare.

Language of Text: German with an English summary.


Descriptors: transport of horses, legal liability for horseback riders, risks associated with horses, law and legislation.

Language of Text: German.


Descriptors: artificial insemination in horses, veterinary legislation, Europe, horses, Netherlands, horse breeding and reproduction.

Language of Text: Dutch.


Descriptors: contract law, Germany, horse purchase legislation, horse sale legislation.

Language of Text: German.


NAL Call Number: QL750.E82

Descriptors: horses, laws, legislation, breeding, reproduction, artificial insemination, partuition.

Language of Text: Italian.


Descriptors: equine veterinary medicine, veterinary nursing, legislation, pharmacology.


Descriptors: animal welfare legislation, surgical decisions, horse health and welfare, decision making, evidence based medicine, Netherlands, tail surgery, veterinary medicine.

Language of Text: Dutch.


NAL Call Number: 41.8 P882

Descriptors: horses, laws, legislation, drug administration, therapy.

Language of Text: German.


NAL Call Number: SF603.V43

Descriptors: horses, mare milk, legislation, laws, milk products, marketing, food safety.

Language of Text: German with an English summary.


**Descriptors:** horses, animal transport, laws and regulations, USDA, animal welfare, stocking rate, duration, trailers, literature reviews, distance-traveled.


**Descriptors:** horses, animal welfare, legislation, history, United States.

**Language of Text:** English with a German summary.

**Notes:** Meeting Information: Association for Equine Sports Medicine, 15th Meeting on Equine Welfare and Sports Medicine, Bonn, Germany; June 24-28, 1996.


**Descriptors:** horses, analgesics, detection, legislation, history.

**Language of Text:** Dutch.

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**Law and Legislation -- Web Resources**

**Animal Law Review.**

**Online:** [http://www.lclark.edu/law/law_reviews/animal_law_review/](http://www.lclark.edu/law/law_reviews/animal_law_review/)

**Description:** Law review maintained by the students of Lewis & Clark Law School with the purpose of educating individuals on animal related legal issues. Provides links pertaining to animal related law as well as information on subscription and submission to the journal.

**Journal of Animal Law and Ethics.**

**Online:** [http://www.law.upenn.edu/groups/jale/](http://www.law.upenn.edu/groups/jale/)

**Description:** Independent student maintained journal at the University of Pennsylvania Law School started in Spring 2005 providing an interdisciplinary forum for animal legal and ethical issues. Includes journal subscription and submission information.

**Horse Welfare in North America.** *Freeman, D.A.*

**Online:** [http://www3.vet.upenn.edu/labs/equinebehavior/hvnwkshp/hv02/freeman.htm](http://www3.vet.upenn.edu/labs/equinebehavior/hvnwkshp/hv02/freeman.htm)

**Description:** Discussion of the current state of equine welfare legislation in North America.

**AWIC Newsletter: The Horse Protection Act.**

**Online:** [http://www.nal.usda.gov/awic/newsletters/v8n2/8n2hpa.htm](http://www.nal.usda.gov/awic/newsletters/v8n2/8n2hpa.htm)

**Description:** Describes specific components of the Horse Protection Act and includes details on enforcement and penalties for non-compliance.

**Michigan State University College of Law: Animal Legal and Historical Web Center.**

**Online:** [http://www.animallaw.info/](http://www.animallaw.info/)

**Description:** Over 700 full-text animal related court cases and legal articles. Provides Web search capabilities.
by location, subject, and species.

**U.S. Code: Title 15, Chapter 44—Protection of Horses.**

*Online:* http://www.law.cornell.edu/uscode/html/uscode15/usc_sup_01_15_10_44.html  
*Description:* Links to sections of the U.S. Code pertaining to horse protection.

**Equine Law. Miller, G.& M.P.S.C.**

*Description:* Provide articles on horse laws, selected cases on equine-related matters, and resources for horse owners, horse-related businesses, and lawyers advising clients on horse-related topics.

**Equine Law Pathfinder. Victoria Williamson.**

*Description:* Regulations and codes for U.S. equine law, legal periodical articles and encyclopedias, bibliography of in-print and internet equine law resources, and specific legal cases.

**Horse Protection Act Information.**

*Description:* Includes links to the Horse Protection Act, horse protection training manual, current issues involving the Horse Protection Act, and related USDA, Animal Care publications.

**Rowland v. USDA.**

*Online:* http://asci.uvm.edu/equine/law/cases/cruel/rowland.htm  
*Description:* Rowland challenges the USDA decision to exclude his Tennessee Walking Horse from the show ring and the $2000 fine. Rowland bases his challenge on the fact that his horse showed signs of previous soring but was not sore at the time of examination. The Court upholds the USDA decision based on the Horse Protection Act (HPA) stipulation that any horse born after the effective date of the HPA showing signs of soring shall be withheld from future showing.

**Horse Protection Program Strategic Direction Summary, Public Meetings, 1996. Stull, C.L.**

*Online:* http://www.vetmed.ucdavis.edu/vetext/INF-AN/INF-AN_HORSPRTX1.HTML  
*Description:* Extensive summary of multiple aspects of the Horse Protection Act.

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Last updated: October 25, 2011
Nutrition and Feeding


Descriptors: heat stress, foot diseases, horses, organic diseases, stress, laminitis.


Abstract: Seven, 3-year-old pony mares (approximately 230 kg) were used in a cross-over study to compare the appetite, energy and nutrient digestibilities, growth rate and feeding behaviour, when a complete diet was offered ad libitum in either the original loose-chaff mix (C), or as a more convenient, milled and pelleted preparation (P). Ad libitum access to the study diet (gross energy = 17.2 MJ/kg dry matter (DM)) was attained over 2 weeks. In the following 4 weeks, groups 1 (no. = 3) and 2 (no. = 4) received pelleted and chaff-based diets respectively. Dietary forms were exchanged during week 5 and ad libitum provision continued for a further 4 weeks. Behaviour and apparent nutrient digestibilities were assessed in weeks 3 and 4 of each period. Pelleted food had a lower proportion of water (P, 0.12; C, 0.22), but relative proportions of oil (0.04), crude protein (0.08), crude fibre (0.29), neutral-detergent fibre (NDF; 0.53) and gross energy (GE) were neither altered by food processing nor time. Apparent digestibilities (DM, 0.49; GE, 0.50; NDF, 0.40 in period 1) of the pelleted and chaff-based diets were similar within periods but decreased (P < 0.01) to a similar extent for both diet types (proportional changes: DM, -0.14; GE, -0.16; NDF, -0.28) in period 2. Overall, mean intakes of digestible energy (DE) for chaff-fed animals during period 1 were 0.73 (P < 0.001) of pellet DE intake (DEI). Mean DEI of pellets increased (P < 0.001) during period 1 to attain 1.76 (s.e. 0.25) MJ/kg M0.75 on day 25. Following transfer from pellets to chaff, DEI decreased (P < 0.001) to 0.68 (s.e. 0.07) MJ/kg M0.75 by the end of period 2. In contrast, DEI of animals which progressed from chaff to pellets remained relatively constant between periods. Oestrous behaviour caused no detectable change in the appetite of individual mares. Irrespective of differences in DEI, average daily gain (ADG) in body weight and condition score (CS) did not differ between groups. Overall, mean ADG decreased (P < 0.01) from 1.54 (s.e. 0.17) kg/day in period 1 to 0.26 (s.e. 0.08) kg/day in period 2. Changes in body weight were associated with CS (R2 = 0.72). Each CS point represented a 53.4 (s.e. 4.8) kg gain in body weight. Chaff meals were longer (30.6 (s.e. 1.6) min, P < 0.001), less frequent (23.8 (s.e. 1.4) per day, P < 0.001) and increased chewing requirement (23 (s.e. 1.2) per bite, P < 0.001), which decreased the rate of DM intake (17.0 (s.e. 0.9) g/min, P < 0.001). Overall, chaff-fed animals spent more time feeding (0.50 (s.e. 1.3) of the time; P < 0.001), primarily at the expense of non-feeding activity and rest. The ad libitum feeding regime enabled stabled ponies to re-establish natural feeding patterns and offers a viable alternative to meal and forage feeding. The more slowly ingested chaff form maximized time spent feeding and limited changes in DEI during the introductory period. Although CS and ADG increased over the first 4 weeks, growth and appetite returned to near maintenance values within 9 weeks in association with a decrease in dietary energy intake and nutrient...
Descriptors: horses, unrestricted feeding, feeding behavior, pelleted feeds, chaff, forage, complete feeds, energy intake, voluntary intake, body weight, body condition, digestibility, appetite, feeding preferences.


Descriptors: evaluation methods, non-linear passage model, total tract retention time, hindgut fractional passage rates, hay, concentrates, effect of caecal cannulation on passage parameters.


NAL Call Number: SF1.A56

Descriptors: horses, feeding preference, nutrient content.


NAL Call Number: 41.8 Am3

Descriptors: horses, feeding, nutritional intake, dental effects, feed digestibility, molars.


NAL Call Number: 41.8 Am3

Descriptors: horses, pregnant mares, nutrition, dentistry, floating teeth, body condition score.


NAL Call Number: QL750.A6

Descriptors: horses, learning, behavior patterns, feeding preferences.


NAL Call Number: 41.8 V641

Abstract: A severe, advanced case of nutritional osteodystrophia fibrosa is described in a 10-year-old gelding with primary upper respiratory obstruction and chronic weight loss, which was one of a group of similarly affected horses in Ethiopia. The diagnosis was based on the clinical signs, gross lesions, histopathology and management history. The affected bones had suffered severe mineral depletion.

Descriptors: bone diseases, nasal obstruction, vitamin D deficiency, osteodystrophia fibrosa, gelding, upper respiratory obstruction, weight loss, Ethiopia.


NAL Call Number: 41.8 D482

Abstract: The control of husbandry by veterinarians with the prospect of animal welfare demands a valuation of the nutritional status of farm animals. The situation of main importance is a suspected undernutrition. A prolonged failure in nutrient and energy supply results in mobilisation of body fat as well as body protein. Especially the protein depletion includes a loss of capacity of several essential functions, e.g. of the immune...
system or the respiratory tract. Undernutrition is often classified as stress, but the typical parameters for stress related reactions offer no sufficient information to evaluate a case of undernutrition. A useful tool to justify the nutritional status of an animal is the amount of body fat by sonographic measurements. Processes related to reproduction are rather sensible to a reduction of body fat; although they are less expensive by energy point of view compared to exercise or milk production. Measuring body fat offers the opportunity to describe the degree of undernutrition and to appreciate, if a malnourished animal is damaged accordingly the definitions of animal welfare. However, the equipment and the experience to use sonographic methods is often not available for veterinarians, who are responsible in official control of husbandry. But the visual and manual procedures to proof defined areas, mainly related to back fat thickness, well known as the body condition scoring, alternatively can be used. The body condition score systems, as defined for cows, sheep and horses, are proofed by different experiments with regard to accuracy and reproducibility. They completely cover the demand in precision to evaluate body fat and in consequence the nutritional status of an animal.

Descriptors: animal husbandry, animal welfare, body condition score, cattle, horses, nutritional status, health status, veterinary medicine, malnutrition, protein depletion.

Language of Text: German.

NAL Call Number: QL750.A6
Descriptors: feeding frequency, stereotyped behavior, feed concentrates.

Descriptors: animal nutrition, dental caries, dental health, dentistry, dentition, diet, digestibility, mastication, reviews, teeth, tooth diseases, horses.

NAL Call Number: 41.8 Am3
Descriptors: equine motor neuron disease (EMND), intrinsic elements, nutrition risk factors, oxidative stress as a risk factor, epidemiology, age and breed effects, rabies vaccination effects, feeding practices, exercise, grass paddocks, vitamin E, selenium.

NAL Call Number: 41.8 V641
Descriptors: horses, digestive disorders, nervous system diseases, animal diseases, feeding habits, behavior, behavior, disorders, functional disorders, organic diseases, grass-sickness, dysautonomia.

NAL Call Number: SF951.J65
Descriptors: horses, fiber, digestibility, digesta passage rate, transit time, hay:grain ratios, barley, feeding disorders.

Online: www.bvapublications.com
Descriptors: horses, donkeys, hyperlipaemia, clinical conditions, lipid-free partial parenteral nutrition, glucose, amino acids, energy, triglyceride concentration, clinical response.
NAL Call Number: SF955.E6
Descriptors: horses, nutrition, colic surgery, parenteral nutrition, intestinal resection.

NAL Call Number: 41.8 V641
Abstract: Several clinical variables were compared in two groups of 15 horses recovering from resection and anastomosis of a strangulated small intestine; 15 were treated with parenteral nutrition and 15 were starved routinely. There was some evidence that parenteral nutrition had a short-lived adverse effect on both the catheter sites and gastric emptying, but there were no marked adverse clinical effects and no evidence of any improvement in the horses' condition.
Descriptors: abdomen, anastomosis, parenteral nutrition, horse diseases, laparoscopy, postoperative complications, treatment outcome.

NAL Call Number: SF285.5.E97 1997
Descriptors: horses, feeding and feeds, horses nutrition.

NAL Call Number: 41.8 SCH9
Descriptors: horses, hypersensitivity of respiratory tract to fungi and thermophil aktinomyces, chronic obstructive pulmonary disease (COPD), feeding practices, equine health, dental problems in horses, gastric ulcers, colic, Switzerland.
Language of Text: German.

NAL Call Number: SF1.A56
Abstract: Relationships among photoperiod and changes in voluntary food intake, feeding behaviour, growth and pelage were determined in seven, 2-year-old pony colts (182.4 (s.e. 5.4) kg). Individually housed colts were provided with ad libitum access to a complete pelleted diet (gross energy = 16.7 MJ/kg dry matter). Voluntary food intake (VFI, kg/day) was calculated daily and body weights were recorded weekly throughout the 36-week study. Feeding behaviour was evaluated at approximately 4-week intervals by continuous observation (24 h), and the hair weight density (HWD, mg/cm2) of shoulder pelage was determined fortnightly. Day length was artificially manipulated to mimic the prevailing mid-summer photoperiod (16 h light:8 h dark, 16L:8D). After 1 week of the study (and the preceding fortnight), day length was abruptly decreased and thereafter animals were exposed to alternating 14-week periods of short (SD, 8L:16D) and long days (LD, 16L:8D). The mean daily VFI of individual ponies was calculated weekly and normalized for digestible energy (DE) content and metabolic body weight (DEI, MJ/kg M0.75). The average daily gain (ADG, kg/day) in body weight of each individual was calculated weekly. The apparent digestibility of dietary energy (digestibility) was determined over 72 h (no. = 6) on two occasions (days 92 to 95 and 190 to 193) during the study. Digestibility was similar in both periods (0.48, s.e. 0.01). DEI, ADG and HWD changed in a cyclic manner throughout the study. The period of the appetite cycle (24.4 (s.e. 1.3) weeks) did not differ from that of the 28-week photoperiodic regime. DEI decreased from a maximum of 1.4 (s.e. 0.03) MJ/kg M0.75 per day (day. 21), to a nadir of 0.75 (s.e. 0.02) MJ/kg M0.75 per day (day 154, P < 0.001) and had increased (P < 0.001) to attain a second zenith (0.93 (s.e. 0.01) MJ/kg M0.75 per day) before the end of the study. Ponies ate discrete meals of similar duration, but meal
frequency was associated with changes in VFI ($r = 0.77$) as was proportion of time spent feeding ($r = 0.79$). Changes in ADG reflected those of DEI. Body weight was stable for 4 weeks at the nadir of the appetite cycle. Maximal HWD was coincident with the nadir of the appetite and growth cycles. Regression of individual values for DEI on ADG described a linear relationship ($R^2 = 0.80$) which could be used to predict the energy requirements of growing ponies maintained under similar conditions: $\text{DEI(\text{total}) (MJ/kg M}^{0.75} \text{ per day)} = 0.654\text{ADG (kg/day)} + 0.789$. The duration of the photoperiod, appetite, growth and pelage cycles were similar, suggesting a causal relationship. Physiological responses to photoperiodic change were not immediate and exhibited a delay of 5 to 8 weeks.

**Descriptors:** colts, photoperiod, appetite, voluntary intake, energy intake, feeding frequency, duration, coat, seasonal variation, hair, weight, density.


**Abstract:** Poisoning cases in horses associated with dietary exposures can encompass a wide variety of etiologies that can be caused by natural or man-made components. Feed mixing errors and ingestion of feed formulated for other species are the most common means by which poisonings from man-made materials occur. Ionophore feed additives and antibacterial agents are especially toxogenic to horses. Effects of ionophores in horses include clinical, clinicopathologic, and pathologic changes associated with cardiac, muscular, and neurologic tissues involvement. The acute effects of ionophores, however, can result in long-term cardiac dysfunction. Antibacterial effects are associated with changed microbial populations in the digestive tract that results in bacterial toxin liberation. These bacterial toxins damage the mucosa, and they result in systemic effects. For either type of feed-associated poisoning, it is critical that samples be analyzed for an accurate diagnosis.

**Descriptors:** animal feed associated poisoning, feed mixing errors, ionophore feed additives, antibacterial agents added to feed, toxicity, cardiac dysfunction, bacterial toxins, sample analysis.


**Descriptors:** animal nutrition, electrolytes, energy intake, energy requirements, horse feeding, nutrient requirements, racehorses, vitamin supplements, water intake, horses.


**Descriptors:** horses, behavior, nutrition, veterinary medicine, dietary supplements, stress, calming methods.


**Descriptors:** energy requirements for horses, equine diets, literature review, maintenance and energy, calculating available energy in diets.


**Descriptors:** dietary fats, tractibility of horses, behavioral observations, pedometer, reactivity, reduction in activity and reactivity of horses.


**Descriptors:** horses, forage evaluation, forage quality, forage composition, literature reviews.

**NAL Call Number**: SF1.A56

**Abstract**: Three experiments were conducted to investigate the effect of bag incubation sequence on the degradation of food components in situ in the caecum of mature, caecally fistulated Welsh-cross pony geldings (mean live weight 278 kg) offered hay ad libitum. In experiment 1 a fibre-based commercial horse concentrate was incubated in situ using a forward (3, 5, 16, 8, 24, 48 h) or reverse (48, 24, 8, 16, 5, 3 h) incubation sequence. Dry matter (DM), crude protein (CP), neutral-detergent fibre (NDF) and acid-detergent fibre (ADF) degradation coefficients and calculated effective degradability (ED) values were determined. In experiment 2 unmolassed sugar-beet pulp (USBP), hay cubes (HC), soya hulls (SH) and a 2:1 mixture of oat hulls:naked oats (OHNO) were incubated in situ as for experiment 1. In experiment 3 unprocessed barley (UB), micronized barley (MB), extruded barley (EB) and dehydrated grass (DHG) were incubated in situ according to slightly different forward or reverse incubation sequences of (2, 4, 6, 12, 8, 24, 48 h) and (48, 24, 8, 4, 12, 6, 2 h) respectively. In experiments 2 and 3 only DM degradation parameters were studied. Of the three starch-based foods studied in experiment 3 (UB, MB and EB), incubation sequence did not significantly (P > 0.05) affect any of the degradation parameters examined. Conversely however, of the six fibre-based foods which were examined across the three experiments, incubation sequence did significantly (P < 0.05) affect in situ degradation parameters in the commercial horse concentrate in experiment 1, the SH food in experiment 2 and the DHG food in experiment 3. Depending on the food or food constituent studied (i.e. DM, CP, NDF or ADF) degradation coefficients, a, b, c and a + b along with ED values calculated at fractional outflow rates of 0.05 and 0.025 could all be statistically different (P < 0.05) according to whether a forward or reverse incubation sequence was used. It is postulated that this effect is related to the basic digestive physiology of the equine caecum which is small, digesta passage rate through it is fast and digesta volumes can vary considerably. These factors may interact to create a considerable degree of non-uniformity within the caecal digesta pool in which in situ bags are incubated. Consequently, it is recommended that in future in situ experiments in the equine hindgut, animals are offered ad libitum diets in an attempt to minimize variation within the caecum. It is also recommended that in situ experimental protocols incorporate more than one incubation sequence when the degradation parameters of fibrous foods are studied in equids.

**Descriptors**: horses, cecum, hay, concentrates, biodegradation, fiber content, beet pulp, soybean husks, oats, husks, barley, extrusion, grasses, digestion, dry matter, protein content, crude protein, methodology.


**NAL Call Number**: S451.M6M582

**Descriptors**: horse feed rations, digestive system, feeds, dry matter content, total digestible nutrients, energy value, differences in nutrient requirements during developmental stages, feed formulations, grazing, feeding behavior, nutritive value, level of activity, feed requirements.


**Descriptors**: muscle glycogen concentration, athletic performance, whole body glucose kinetics, glycogen metabolism, horses metabolism, insulin levels.


**Descriptors**: diet, digestive tract, feed additives, microbial flora, probiotics, reviews, horses.


**NAL Call Number**: SF951.J65
Descriptors: horses, horse feeding, hay, barley, ratios, digesta, cecum, colon, intestinal microorganisms, bacteria, pH, lactic acid, volatile fatty acids.


**NAL Call Number:** SF1.L5
**Descriptors:** oats, grass hay, digestibility, hay:oat ratios, feeds, dry matter, digestible energy, nutrient availability, urine analysis, digestive tract.


**Descriptors:** animal nutrition, diet, foot diseases, hooves, lameness, laminitis, reviews, horses.


**Descriptors:** diet composition, hydrogen ion concentration, pharmacology, acid base equilibrium, ammonium chloride.


**Descriptors:** draught horses, mares, foals, stallions, racehorses, animal feeding, roughage, grain feed, feed additives, proximate composition, age, seasons, feed intake, additives, feeding behavior, feeding habits, feeds.

**Language of Text:** Czech.


**Descriptors:** animal nutrition, bone diseases, bones, carbohydrates, colostrum, enzymes, exercise, feed additives, feed formulation, feed supplements, fermentation, foals, in vitro digestibility, milk composition, milk quality, nutrient requirements, nutrition physiology, nutritive value, osteochondritis, racehorses, racing performance, rest, seasonal variation, horses.


**Descriptors:** calories, digestive system, energy balance, energy consumption, feed grains, horse feeding, racehorses, reviews, horses.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, gastrointestinal diseases, parenteral feeding, nutritional support, prognosis, complications, costs, clinical aspects, parenteral nutrition.


**NAL Call Number:** SF951.V47

**Abstract:** Horses with GI diseases such as colic and diarrhea are often intolerant of adequate enteral nutrition. Nutritional intervention should be an early part of therapeutic management in such cases. Protein and energy malnutrition in critically ill horses can have deleterious effects, including poor wound or incisional healing, reduced immunity, and weight loss. Early enteral or parenteral support should be provided to supply resting DE requirements in the equine ICU.

**Descriptors:** animal nutrition, colic, diarrhea, enteral nutrition, horses, nutritional requirements, nutritional status, parenteral nutrition, gastrointestinal diseases, protein and energy malnutrition.


Descriptors: horses, cattle, species coexistence, grazing patterns, pasture management, foraging behavior.


Descriptors: causes of laminitis, microbial ecology, oligofructose-utilizing organisms, induction of laminitis, fecal samples, presence of *Streptococcus* sp.


NAL Call Number: SF810.V4

Abstract: Eighteen mixed-breed, naturally infected ponies ranging in age from 1 to 16 yr and four cyathostome-naive ponies reared and maintained under parasite-free conditions ranging in age from 1 to 4 yr were used in this study. Naturally-infected ponies were treated with 1 dose of ivermectin (IVM) at 200 micrograms kg⁻¹, followed by a 5-day regimen of oxibendazole (OBZ) at 20 mg kg⁻¹ to remove existing cyathostome burdens; cyathostome-naive control ponies were treated with IVM alone. The naturally infected ponies were matched on age and gender, then randomly assigned to one of three treatment groups of six animals per group; the four cyathostome-naive ponies constituted a fourth group. Following OBZ treatment, Group 1 ponies were treated with pyrantel tartrate (PT) in their pelleted ration; the remaining ponies received only the pelleted ration. Beginning on experiment Day 3, a daily challenge infection of 10⁴ mixed cyathostome larvae was administered orally to ponies of Group 1, Group 2 and the cyathostome-naive controls. Group 3 ponies served as unchallenged controls to determine residual parasite burdens following IVM/OBZ treatment. Necropsy examinations were performed on three Group 3 ponies on Day 1; the remainder of the necropsy examinations began on Day 41. Cyathostome burdens were evaluated by recovery of larvae and adults from the luminal contents, by digestions of the intestinal mucosa, and by mural transillumination of full-thickness intestinal sections. Differences in postchallenge clinical responses were also compared. Necropsy examinations included comparisons of grossly visible inflammation of the large bowel, weights of biopsy specimens from each region, and histologic evaluations of these biopsies. Parasite recoveries at necropsy indicated a strong protective effect derived from daily PT treatment. Mean weights of intestinal biopsies corresponded with worm burdens, but histological evaluation did not reveal architectural or cellular changes to account for the increase in weight; therefore, edema was suspected. A strong age-related resistance to challenge infection was apparent in both the PT-treated and control groups by virtue of the lower mean worm burdens found in older ponies compared to younger ponies of the same treatment group; however, daily PT treatment of older ponies reduced the variability...
of their worm burdens to a uniformly low level. Comparisons of luminal and mucosal parasite burdens of age stratified nontreated controls further suggest that the age related resistance, which is acquired, targets increasing numbers of parasite stages as this resistance matures. Further, there is no evidence for an immune mediated acquisition of hypobiotic L3.

**Descriptors:** cyathostome, parasite load, ivermectin, oxibendazole, worming, pyrantel tartrate protective effect, worm burdens, age-related resistance to parasite infection.


**NAL Call Number:** SF285.5.N373 1999

**Descriptors:** effect of drought on horses, Australia, feeding and feeds, nutritional status.

**Notes:** "Project no. DAV-156A".


**NAL Call Number:** SF951.J65

**Descriptors:** horses, training, calcium, phosphorus, mineral nutrition, nutrient intake, dosage, feed supplements, bone density, urine analysis, feces composition, blood chemistry, magnesium, nutrient balance.

**Notes:** Meeting Information: Paper presented at the Equine Nutrition and Physiology Society Annual Symposium, Fort Worth, Texas, USA; May 28-31, 1997.


**Descriptors:** animal nutrition, animal sports, body weight, feed intake, feeding frequency, feeds, horse feeding, nutrient deficiencies, reviews, horses.


**NAL Call Number:** SF285.5.A39 2005

**Descriptors:** nutrition, feed management methods, development, diseases, effects of nutrition, exercise, immune system, musculoskeletal system, nutrition related performance disorders.


**NAL Call Number:** 389.79 C81

**Descriptors:** horse feeding, feed grains, diet, processing, selenium, nutrient sources, dietary fat, exercise, digestion, blood sugar, responses, feeding, timing, saddle performance.


**NAL Call Number:** 389.8 J82

**Descriptors:** Thoroughbred horses, geldings, digestibility, exercise effects, rate of passage, forage.


**Descriptors:** oral starch tolerance test, oat grains, starch intestinal overload, glycemia, lactic acidemia, pasture, concentrates, glycemic curves, lactic acidemic curves.

**Language of Text:** Spanish with an English summary.

Online: http://www.sciencedirect.com/science/journal/15347516
Descriptors: diet composition, roughages, concentrates, weight loss, malnutrition.
Notes: Special issue: *Equine Dentistry.*

NAL Call Number: SF955.E6
Descriptors: horses, digestibility, dentistry, teeth, dry matter, crude protein, fiber, hay, feed grains, adverse effects, digestion.

Online: http://www.fasebj.org/
NAL Call Number: QH301.F3
Descriptors: nutrition, blood chemistry, electrolytes, plasma TCO2, acid-base and electrolyte status, Standardbred horses, traditional racehorse diet, blood sampling, meeting abstract.
Notes: Meeting Information: FASEB Meeting on Experimental Biology: Translating the Genome, San Diego, CA, USA; April 11-15, 2003.

NAL Call Number: 389.78 Z3
Descriptors: geldings, lucerne, pellets, briquettes, nutrients, digestibility, formulations, feed intake, behavior, feeding habits, feeds, formulations, green feed, nutritive value, quality.

NAL Call Number: 389.78 Z3
Descriptors: horses, feeding level, nutrients, digestibility, energy value, flow rate, tracer techniques, feces, excreta, feeding, fluid flow, fluid mechanics, nutritive values.

NAL Call Number: aSF757.5.F86 2000
Descriptors: fumonsins, mycotoxins, feeds contamination, United States.

NAL Call Number: 41.8 V644
Descriptors: nutrition for compromised horses, dietary nutrition, disease specific nutrition, digestion physiology, rules of nutrition according to each disease.
Language of Text: Hungarian.


Abstract: The aim of this study was to apply the(13)C-octanoic acid breath test for detection of alterations in the rate of solid-phase gastric emptying, induced by changes in test meal composition, in ponies. After a 14 hour fast the ponies (n = 4) ingested a test meal with 0, 35 or 70 ml soya oil, and labelled with 250 mg(13)C-octanoic acid. Each pony was given each of the three test meals on three separate occasions, in a randomised order. Exhaled breath samples were collected for 12 hours after ingestion of the test meal. Breath samples were analysed by continuous flow isotope ratio mass spectrometry. Three indices of breath(13)C-enrichment were computed, half-dose recovery time (t 1/2), gastric emptying coefficient (GEC) and time to peak breath(13)C-excretion t(max). The(13)C-octanoic acid breath test was a reliable means of assessing the significantly decreased rate of gastric emptying in the pony, associated with addition of soya oil to the test meal.

Descriptors: gastric emptying, octanoic acids, animal feed, breath tests, carbon isotopes, cross over studies, horse metabolism, soya oil, C-octanoic acid.


Abstract: Meteorism and colics were observed in horses after grazing on young pasture. The botanical analysis of a sample as taken by the owner revealed a great diversity of grasses, herbs and legumes. Houndstongue (Cynoglossum officinale) in its rosette stage was identified in amounts of 1% of the total sample, although this cannot be regarded as representative for the composition of the green fodder. This plant has been reported to be highly toxic for horses and other species, mainly during the early growth stadium due to its contents of pyrrolizidin alkaloids with a strong hepatotoxic activity. In the present case it remained unclear, whether the horses actually ingested this poisonous plant in relevant amounts. In general it has to be emphasised, that a contamination especially of hay or silage bears a severe risk for horses. The contamination of green fodder with houndstongue can be a serious problem for the feeding practice in certain regions (dry grassland, loess or shell lime soil, extensive management).

Descriptors: houndstongue, Cynoglossum officinale, toxic plants found in pastures, pasture health, horse health and nutrition, toxicity, hay or silage contamination, colic, young pasture, meteorism.

Language of Text: German.
Nutrition -- Web Resources

Equine Nutrition Research Updates - UK Animal & Food Sciences.
  Online: http://www.uky.edu/Agriculture/AnimalSciences/equine/equineresearchupdates.html
  Description: Links to current journal articles on equine nutrition research.

Horse Nutrition, Bulletin 762-00, Carbohydrates and Fats.
  Online: http://ohioline.osu.edu/b762/b762_7.html
  Description: Discusses carbohydrate and fat content as well as the nutritional value of various roughages and concentrates.

Horse Nutrition, Bulletin 762-00, Protein.
  Online: http://ohioline.osu.edu/b762/b762_8.html
  Description: Provides protein needs based on horses' size, age, and use. Also includes various sources of protein that can be included in an equine diet.

  Online: http://old.cvm.msu.edu/news/Press/eqfoodwn.htm
  Description: Feeding method to maintain horse health and condition during the colder winter season.

Basics of Feeding Horses: Reading the Feed Tag, G00-1403-A. Anderson, K.
  Online: http://ianpubs.unl.edu/horse/g1403.htm
  Description: Explains the function of essential nutrients and how to interpret the tag on commercial horse feeds.

  Online: http://www3.vet.upenn.edu/labs/equinebehavior/hvwnkshp/hv02/davidson.htm
  Description: Effect of nutritional management on equine well being. Discusses both beneficial and detrimental practices.

Alternative Feeds for Horses. Kruse, K.
  Online: http://agbiopubs.sdstate.edu/articles/ExEx2039.pdf
  Description: Cost effective nutrition and details the use of roughage and grain alternatives.

Feeding Management for Horse Owners. Lardy, G. and C. Poland.
  Online: http://www.ext.nodak.edu/extpubs/ansci/horse/as953w.htm
  Description: Presents feeding practices tailored to the anatomy of the equine digestive tract. Details amounts and quality of roughages and concentrates to feed horses based on weight and workload, as well as the effects of dental health, supplement administration, and ration alteration.

Nutrient Requirements and Balancing Rations for Horses. Lawrence, L.A.
  Description: Feeding rules, methods for balancing rations, specific ration calculation strategy, and condition evaluation chart.

Minerals in Equine Nutrition: Science and Application. Lawrence, L.
  Online: http://www.tennesseenutritionconference.org/pdf/Proceedings2005/LaurieLawrence.pdf
  Description: Mineral requirements for horses, practical methods of meeting these requirements, and comparison of apparent versus true mineral digestibility.
Decreasing the Cost of Feeding Horses. McCall, C.A.
   Online: http://www.aces.edu/pubs/docs/A/ANR-0849/
   Description: Details amounts of specific nutrients needed by horses based on age, physiological state, and size. Includes management strategies for cost effective feeding.

   Online: http://evrp.lsu.edu/healthtips/EquineNutrition.htm
   Description: Guide to developing an equine nutrition program to enhance welfare and performance and avoid feed related ailments.

Horses Publications: The Basics of Equine Nutrition. Williams, C.A.
   Online: http://www.rcre.rutgers.edu/pubs/publication.asp?pid=FS038
   Description: Fact sheet describing equine nutritional needs based on nutrient category. Discusses forages and concentrates as well as food quality and supplementation.

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Last updated: October 25, 2011
Feeding Methods

NAL Call Number: QL750.E82
Abstract: The interest for oral and locomotory behaviour troubles in sport horses is increasing. Management faults, nutritional unbalances, excessive stress level can increase the incidence of these disorders. In this work we describe the effects of some practical feeding changes on the occurrence of coprophagy, in a sport horses stable where this disorder was widespread: 40 horses were present, of which 16 showed coprophagy. These 16 sport horses were divided into experimental groups (3 experimental groups in the first two experimental moments and 4 experimental groups in the third and last) with the aim of comparing the effect of different rations (in particular with no premix or different vitamins and trace elements premix levels). Feeding strategy showed a significant effect in the occurrence of coprophagy, even though other factors, not related to feeding, played an evident role. A vitamin and trace elements premix, added to the rations, decreased the frequency of coprophagy observation. This behaviour disorder can be evidently reduced in horses that show low frequency of occurrence by a proper premix, in particular using vitamins B1, B6, B12, folacin and vitamin C at high doses.
Descriptors: racehorses, abnormal behavior, coprophagia, excessive stress levels, management of horses, effects of nutrition on behavior, use of vitamins B1, B6, B12, folacin and vitamin C to reduce coprophagy, animal supplements, in vivo experimentation, nutritional disorders.
Language of Text: Italian.

NAL Call Number: SF1.A56
Descriptors: allergens, hay, horses, nutritive value, hydration, dust, steaming, minerals, carbohydrates, antigens, feeds, heat treatment, immunological factors, pollutants, processing, quality, roughage, nutrient content, wetting.

Descriptors: horses feeding and feeds, glucose, glycogen.
Notes: Thesis (M.S.)--University of Kentucky, 1995.

NAL Call Number: 49 J82
Abstract: Leptin is a protein hormone produced by adipose tissue that influences hypothalamic mechanisms regulating appetite and energy balance. In species tested thus far, including horses, concentrations of leptin increase as animal fat mass increases. The variables and mechanisms that influence the secretion of leptin are
not well known, nor is it known in equine species how the secretion of leptin is influenced by acute alterations in energy balance, circadian patterns, and/or reproductive competence. Our objectives were to determine in horses: 1) whether plasma concentrations of leptin are secreted in a circadian and/or a pulsatile pattern; 2) whether a 48-h period of feed restriction would alter plasma concentrations of leptin, growth hormone, or insulin; and 3) whether ovariectomy and/or a melatonin implant would affect leptin. In Exp. 1, mares exposed to ambient photoperiod of visible light (11 h, 33 min to 11 h, 38 min), received treatments consisting of a 48-h feed restriction (RES) or 48 h of alfalfa hay fed ad libitum (FED). Mares were maintained in a dry lot before sampling and were tethered to a rail during sampling. Analyses revealed that leptin was not secreted in a pulsatile manner, and that mean leptin concentrations were greater (P < 0.001) in FED vs. RES mares (17.20 ± 0.41 vs. 7.29 ± 0.41 ng/mL). Plasma growth hormone was pulsatile, and mean concentrations were greater in RES than FED mares (2.15 ± 0.31 vs. 1.08 ± 0.31 ng/mL; P = 0.05). Circadian patterns of leptin secretion were observed, but only in FED mares (15.39 ± 0.58 ng/mL for morning vs. 19.00 ± 0.58 ng/mL for evening; P < 0.001). In Exp. 2, mares that were ovariectomized or intact received either a s.c. melatonin implant or a sham implant. Thereafter, blood was sampled at weekly intervals at 1000 and 1700. Concentrations of leptin in samples collected at 1700 were greater (P < 0.001) than in those collected at 1000 (28.24 ± 1.7 vs. 22.07 ± 1.7 ng/mL). Neither ovariectomy nor chronic treatment with melatonin affected plasma concentrations of leptin or the circadian pattern of secretion. These data provide evidence that plasma leptin concentrations in the equine are sensitive to acute changes in nutritional status and vary in a circadian pattern that is sensitive to fasting but not to melatonin treatment or ovariectomy.

Descriptors: horses, leptin, circadian patterns, plasma concentration.


NAL Call Number: 49 J82

Abstract: Our goal was to establish a time of day and(or) interval from feeding that would avoid the refractory period after a somatotropin (ST) surge and optimize the responsiveness of horses to ST secretagogues. Two experiments were conducted with eight geldings conditioned to consume grain at 0800 and 1600 daily. In Exp. 1, during a 24-h period, these geldings averaged 3.2 ± .3 pulses of ST with peak amplitude of 4.2 ± .4 ng/mL, pulse duration of 55 ± 6 min, and interpeak interval of 400 ± 57 min. No ST peaks occurred within 2 h after either grain feeding. In Exp. 2, eight geldings were given 50 micrograms of ST-releasing factor (STRF) at 0800. Two geldings that had a pulse of ST between 0700 and 0800 failed to respond to STRF, but the other six responded with a pulse of ST at 37 ± 3 min; peak amplitude was 4.6 ± 2.2 ng/mL and duration was 123 ± 25 min. Experiments 3 and 4 were with mares aged 20 to 26 yr and conditioned to be fed grain at 0800 daily. In Exp. 3, blood was sampled for 8 h beginning at 0500. Seven of the eight mares had a ST pulse in progress at 0500. Five additional pulses were detected, all from 0740 to 0940, but none from 0600 to 0700 or from 1000 to 1300. In Exp. 4, four of the same eight mares were given 50 micrograms of STRF at 0700 and the other four at 1300. Three of the four treated at 0700 and all four treated at 1300 responded to STRF with ST peaks at 20 ± 5 min; peak amplitude was 12.7 ± 9.5 ng/mL and duration was 69 ± 6 min. In Exp. 5, nine mares aged 20 to 26 yr were fed grain at 0800 and 1600 as in Exp. 1 and 2 and given a nonpeptidal ST secretagogue (STS, Merck L-163,255) i.v. at 0, 1, or 5 mg/kg (n = 3 mares/dose) at 1300. No mare had a pulse of ST during the 1 h before treatment. All six mares given STS responded with ST pulses. The ST responses to STS at 1 and 5 mg/kg did not differ (P > .05); time to ST peak was 35 ± 4 min, pulse amplitude was 24.0 ± 6.3 ng/mL, and pulse duration was 100 ± 9 min. We conclude that mares and geldings fed grain once or twice daily usually have a period of 2 to 5 h after feeding with no ST pulses. When horses are fed grain at 0800, one may give a ST secretagogue at 1300 to avoid a refractory period and improve the probability of an ST response.

Descriptors: horses, age groups, hormone secretion, somatotropin, somatoliberin, circadian rhythm, hormonal control, feeding, blood plasma.


NAL Call Number: 49 J82
Descriptors: feeding, starch digestion, prececal digestion, feed composition.

NAL Call Number: SF951.J65
Descriptors: horses, fiber, digestibility, digesta passage rate, transit time, hay:grain ratios, barley, feeding disorders.


Descriptors: contaminants, feces, feed intake, feeding behavior, feeding preferences, foraging, grass sward, nutritive value, parasites, parasitism, *Dactylis glomerata*, *Festuca arundinacea*, horses, *Lolium perenne*, *Strongylidae*, *Trifolium repens*.

NAL Call Number: Videocassette no. 2731
Abstract: Texas Agricultural Extension Service horse specialist Dr. Doug Householder hosts a program that tries to provide an understanding of horse nutrition, the composition of feeds, and horse behavior. Covers classes of horses and basic feeding programs, determining body weights and condition scoring, storing hays and concentrates, feeding hays, feeding concentrates, and managing eating behaviors. Support publications: The digestive system of the horse / D. Douglas Householder, Gary D. Potter, and Pete G. Gibbs (4 p.); Feeding management points for Texas horse owners by D. Douglas Householder et al. (7 p.).
Descriptors: nutrition, feed composition, horse behavior, body weight determination, body condition scoring, hays, grain, eating behaviors, equine digestive system.
Notes: "Funding for scripting provided by the Animal Nutrition Division of Cargill, Incorporated, Minneapolis, Minnesota." "Tape TAM37005".

NAL Call Number: 41.8 Am3
Abstract: OBJECTIVE: To determine whether specific feeding practices were associated with development of colic in horses. DESIGN: Prospective matched case-control study. ANIMALS: 364 horses examined by veterinarians in private practice in Texas because of colic (cases; n = 182) or any other reason (controls; 182). PROCEDURE: Participating veterinarians were sent forms at the beginning of the study to collect information on signalment, feeding management practices, farm management practices, and preventive medical treatments. Case and control horses were compared by use of conditional logistic regression to identify factors associated with colic. RESULTS: Risk factors for colic were a recent change in batch of hay, decreased exposure to pasture, a recent change in type of grain or concentrate fed, feeding > 2.7 kg (6 lb) of oats/d, feeding hay from
CONCLUSIONS AND CLINICAL RELEVANCE: Results suggest that certain changes in diet (eg, change in batch of hay, change in type of grain or concentrate, feeding hay from round bales) and management (eg, decreased availability of pasture) increase the risk of colic in horses.

Descriptors: colic, feeding methods, identified colic risk factors, change in batch of hay, decreased exposure to pasture, change in grain, use of round bales, Thoroughbreds, dietary changes and management.


Descriptors: feeds, diet, horses, animal feeding, glucose, insulin, blood composition, blood, grazing, physical activity, aldoses, animal feeding, blood, carbohydrates, hormones, monosaccharides, peptides, reducing sugars, sugars, blood chemistry, exercise.

Notes: Meeting Information: International Conference on Feeding Horses: famous, independent experts talking on a range of topical and controversial subjects. Scientific session.


NAL Call Number: DISS F1996171

Descriptors: horses, animal welfare, respiratory system, hay dust, environmental factors.

Language of Text: German with an English summary.

Notes: Thesis (doctoral)--Tierarztliche Hochschule Hannover, 1996.


NAL Call Number: 447.8 J825

Descriptors: horses, fitness, meal frequency, fluid regulation, plasma aldosterone concentration, voluntary sodium intake.


NAL Call Number: 447.8 J825

Abstract: In a randomized, balanced, crossover study each of six fit, adult horses ran on a treadmill at 50% of maximal rate of oxygen consumption for 60 min after being denied access to food for 18 h and then 1) fed corn (51.4 kJ/kg digestible energy), or 2) fed an isocaloric amount of alfalfa 2-3 h before exercise, or 3) not fed before exercise. Feeding corn, compared with fasting, resulted in higher plasma glucose and serum insulin and lower serum nonesterified fatty acid concentrations before exercise (P < 0.05) and in lower plasma glucose, serum glycerol, and serum nonesterified fatty acid concentrations and higher skeletal muscle utilization of blood-borne glucose during exercise (P < 0.05). Feeding corn, compared with feeding alfalfa, resulted in higher carbohydrate oxidation and lower lipid oxidation during exercise (P < 0.05). Feeding a soluble carbohydrate-rich meal (corn) to horses before exercise results in increased muscle utilization of blood-borne glucose and carbohydrate oxidation and in decreased lipid oxidation compared with a meal of insoluble carbohydrate (alfalfa) or not feeding. Carbohydrate feedings did not produce a sparing of muscle glycogen compared with fasting.

Descriptors: treadmill exercise test, food restriction, corn, alfalfa, plasma glucose and serum insulin levels, carbohydrate oxidation, lipid oxidation during exercise, carbohydrate-rich meals prior to exercise.


NAL Call Number: 41.8 Am3A

Descriptors: horses, exercise, feeding, nutrition, soluble-carbohydrate content, muscle glycogen synthesis.

**Descriptors:** animal nutrition, energy intake, feed intake, feeding, nutrient requirements, protein intake, working animals, horses.

**Language of Text:** Italian with an English summary.


**NAL Call Number:** 41.8 Am3A

**Descriptors:** horses, feeding, nutrition, meal content, gastric relaxation, gastric emptying.


**Descriptors:** bicarbonates, blood chemistry, carbon dioxide, electrolytes, feed supplements, pH, racehorses, reviews, horses.


**Descriptors:** saddle horses, rearing techniques, feeding systems, grazing, concentrates, rations, high forage diets.

**Language of Text:** French.


**NAL Call Number:** SF1.A56

**Descriptors:** soaking hay, allergens, dust in hay, mineral content, particle size, soaking, antigens, immunological factors, pollutants.


**NAL Call Number:** SF810.V4

**Descriptors:** horses, *Trichinella spiralis*, trichinosis, epidemiology, risk factors, animal feeding, meat products, food wastes, feed contamination, feeding behavior, infection, Serbia, equine trichinellosis, infected meat, meat eating behavior.


**NAL Call Number:** SF1.A542

**Descriptors:** horses, stable environment, feeding methods, behavioral evaluation, hay length, feeding time, feeding frequency, feeding location, hay type.


**NAL Call Number:** SF285.5.A39 2005

**Descriptors:** horses, stress, performance, competition, feeding methods, gastrointestinal function, hydration status, electrolytes, nutrition, effect of feeding practices on performance, electrolytes.


**NAL Call Number:** SF955.E6
Abstract: There is considerable debate among horsemen about how to feed horses before exercise. Should horses be fed or fasted before work and when should hay be fed relative to grain and/or exercise? Three experiments were conducted to evaluate if feeding hay with and without grain affects glycaemic and haematological responses in Thoroughbred (TB) horses at rest and during a simulated competition exercise test (CET) on a high-speed treadmill. In Experiment 1, 6 TB horses were fed hay at 3 different times relative to a grain meal. Time of feeding hay affected glycaemic response, plasma protein and water intake post grain feeding. During Experiment 2, 4 TB horses were used in a 4 x 4 Latin square design to determine whether feeding grain with or without hay prior to a CET would affect substrate utilisation and exercise. Feeding grain reduced free fatty acid (FFA) availability and increased blood glucose disappearance during exercise (P < 0.05). Feeding hay either along with grain or ad libitum the night before exercise resulted in reduced plasma volume (P < 0.05) and higher lactate production (P < 0.05) and heart rates (P < 0.05) during exercise. During Experiment 3, 4 TB horses were used in a 4 x 4 Latin square design experiment to determine whether feeding forage but no grain prior to CET would affect substrate utilisation and performance. Feeding only forage before exercise did not adversely affect performance. It was concluded that grain should be withheld from horses before exercise, but that small quantities of hay should be fed to ensure proper gastrointestinal tract function.

Descriptors: Thoroughbreds, feeding horses prior to exercise, glycemice and hematological responses, treadmill exercise, feeding only forage prior to exercise, withholding of grain prior to exercise.


NAL Call Number: 389.8 B773
Descriptors: barley, barley straw, diets, digestibility, digestion, feed intake, forage, hay, lucerne, rumen digestion, straw, cattle, donkeys, horses, Medicago, sheep.


NAL Call Number: SF84.A56
Abstract: The aim of the study was to find out information on the range of hay and oat amounts taken by Polish Konik, Arab Konik and Felin Pony mares fed ad libitum and exercised in standardized work. The mares were subjected to three kinds of experiments: in an electric treadmill, under saddle and in harness. 14 mares took part in 10 experiments, which examined 30 factors. The intensity of work negatively influenced the water and hay intake and positively the oat intake. The latter effect was significant. In all experiments there was a tendency to exceed the nutrient requirements. Arab Konik mares were came out to be the most resistant to be quality of work, while those of Felin Pony type usually reacted with a considerable increase in feed, nutrient and water intake. Polish Konik mares placed themselves at the medium position between the other 2 groups of mares.
Descriptors: horse breeds comparison, Polish Konik, Arab Konik, Felin Pony, mares, exercise, treadmill, under saddle, in harness, effect of work intensity on intake of food and water, animal feeding, unrestricted feeding, nutrient requirements.

Language of Text: Polish with an English summary.


NAL Call Number: 41.8 SCH19
Descriptors: horses, feeding methods, nutrition, feed analysis, feed consumption, eating behavior, digestibility.
Language of Text: French.

Descriptors: horses, management practices, feeding, animal welfare.

**NAL Call Number:** SF956.V64 1996

**Descriptors:** equine sports medicine handbooks, manuals, competition horses diseases handbooks, manuals, competition horses wounds and injuries handbooks, manuals, competition horses health handbooks, manuals.


**Descriptors:** blood plasma electrolyte state, acid base equilibrium, effect of feeding, plasma acidosis, carbon dioxide, hydrogen ion concentration, physicochemical variables.


**Descriptors:** feeding methods, hay consumption time, loose hay versus netted hay, feeding behavior.

**Language of Text:** German with an English summary.
Feeding Restrictions


**NAL Call Number:** 49 J82

**Abstract:** Two studies were performed with Standardbred geldings 7 to 21 yr of age to determine the sequence of changes in blood plasma concentrations of some hormones and metabolites during feed deprivation for 48 h and for 12 h after refeeding. Plasma hormone and metabolite concentrations were determined with methods validated for horse plasma. Insulin-like growth factor binding proteins (IGFBP) were determined with radioligand analysis following SDS-PAGE electrophoresis. In both experiments, plasma concentrations of triiodothyronine and thyroxine decreased (P < .01) during feed deprivation and increased (P < .01) during refeeding. Plasma glucose and IGF-I either decreased or were not altered during feed deprivation. In contrast, plasma concentrations of NEFA and urea nitrogen increased (P < .01) during feed deprivation and decreased (P < .01) during the refeeding period. Plasma somatotropin (ST) increased (P < .01) approximately 80% at 24 to 36 h of feed deprivation, declined (P < .01) to control values at 48 h of feed deprivation, increased (P < .01) nearly three fold at 3 h after refeeding, and returned to control values by 6 h after refeeding. We identified five IGFBP, and their plasma concentrations were not significantly altered during feed deprivation or following refeeding. We conclude that metabolite availability during feed deprivation and following refeeding alters the secretion of thyroid hormones, ST, and possibly IGF-I, thereby maintaining homeostasis in horses.

**Descriptors:** horses, American Trotter, food deprivation, refeeding, blood plasma, insulin like growth factor, binding proteins, triiodothyronine, thyroxine, blood sugar, fatty acids, urea, somatotropin, homeostasis.

**Notes:** Meeting Information: Paper presented at "Stressors That Alter Animal Growth" at the Midwest ASAS/ADSA meetings March 18-20, 1996, Des Moines, IA.


**NAL Call Number:** 41.8 Am3A

**Descriptors:** horses, metabolism, hypothyroidism, feeding practices, plasma lipid concentration, lipoprotein, plasma lipase activity.


**NAL Call Number:** 41.8 Am3A

**Descriptors:** mares, food deprivation, blood lipids, very low density lipoprotein, blood plasma, fatty acids, blood serum, variation, unrestricted feeding, triacylglycerols, blood sugar.

McManus, C.J. (2001). Effect of food restriction and pharmacological repartitioning of energy intake on
reproductive activity in the mare. Dissertation, University of Kentucky: Lexington, Kentucky, USA.

Descriptors: horses reproduction, sexual behavior of animals, mares feeding and feeds, fertility effect of drugs on, mares fertility, fertility nutrition.


NAL Call Number: QL868.D6

Abstract: In a variety of species, short-term feed restriction leads to restriction leads to rapid changes in the reproductive axis and reduces serum levels of leptin. Two experiments were performed to test the hypothesis that a single day of feed restriction in aged and young mares would cause a suppression of the gonadotropins and serum leptin concentrations. The estrous cycles of 12 aged (>eight years; Exp. 1) and eight young (<five years; Exp. 2) mares were synchronized and the mares were conditioned to twice-daily meal feeding. On the seventh day after synchronization, restricted mares (n=6 for Exp. 1; n=4 for Exp. 2) were not fed for 24 hr; all mares were fed the second day. In Exp. 1, serum leptin concentrations significantly decreased in restricted mares, but not in controls. In Exp. 2, serum leptin concentrations declined in restricted mares and no decline was seen in the controls. Serum glucose concentrations did not change in response to feed restriction or refeeding, but in both experiments feed restriction caused an increased in free fatty acids. For both experiments, prolactin, FSH, and LH serum concentrations were not significantly altered by feed restriction. The observed of suppression may reflect the maintenance of sufficient levels of metabolizable fuels, rather than a failure of leptin to signal nutritional status to the reproductive axis of the mare.

Descriptors: mares, restricted feeding, refeeding, hormones, FSH, LH, prolactin, hormone secretion, blood serum, blood sugar, blood lipids, blood plasma, fatty acids, estrous cycle, synchronized females, age.

NAL Call Number: 41.8 Am3A

Abstract: Six healthy, adult horses, with normal (mean +/- SEM) baseline serum concentrations of total triiodothyronine (T3, 1.02 +/- 0.16 nmol/L), free T3 (FT3, 2.05 +/- 0.33 pmol/L), total thyroxine (T4, 19.87 +/- 1.74 nmol/L), free T4 (FT4, 11.55 +/- 0.70 pmol/L), total reverse T3 (rT3, 0.68 +/- 0.06 nmol/L), and cortisol (152.75 +/- 17.50 nmol/L), were judged to be euthyroid on the basis of response to a standardized thyroid-stimulating hormone response test. Serum concentrations of T3, FT3, T4, FT4, rT3, and cortisol were determined immediately before and every 24 hours during a 4-day period of food deprivation, when water was available ad libitum. Similar variables were measured 72 hours after refeeding. Decreases (to percentage of baseline, prefood deprivation value) in circulating T3 (42%), T4 (38%), FT3 (30%), and FT4 (24%) concentrations were maximal after 2, 4, 2, and 4 days of food deprivation, respectively (P < 0.05). Increases (compared with baseline, prefood deprivation value) in rT3 (31%) and cortisol (41%) concentrations were maximal after 1 and 2 days of food deprivation, respectively (P < 0.05). Refeeding resulted in increase in serum T4 and FT4, and decrease in rT3 and cortisol concentrations toward baseline values, after 72 hours (P < 0.05). Refeeding did not effect a return of T3 or FT3 concentration to baseline values after 72 hours (P < 0.05). Food deprivation appears to cause changes in serum concentrations of T3, FT3, T4, FT4, rT3, and cortisol in horses that are similar to those in human beings. This effect of food deprivation should be considered when results of serum thyroid hormone and cortisol assays are interpreted in the face of clinical. disease. These results further emphasize the invalidity of making a clinical diagnosis of hypothyroidism on the basis of baseline, serum thyroid hormone concentrations in horses, especially if the horses have been anorectic or inappetent.

Descriptors: horses, food deprivation, triiodothyronine, hydrocortisone, thyroxine, blood serum, total-thyroxine, free-thyroxine, total-triiodothyronine, free-triiodothyronine, reverse-triiodothyronine.

NAL Call Number: SF951.E62

Descriptors: feed intake, water uptake, hay, feeds, physical activity, digestive system, dry matter content,
moisture content, feed and water restriction, effects of exercise.

NAL Call Number: 41.8 Am3A
Descriptors: horses, stomach ulcers, food deprivation, restricted feeding, gastrointestinal agents, stomach mucosa, lesions, acidity, unrestricted feeding, feeding behavior, grazing, hay.

NAL Call Number: SF955.E6
Descriptors: horses, food deprivation, lesions, stomach mucosa, pectins, phosphatidylcholines, disease prevention, stomach ulcers, pronutrin.

NAL Call Number: 49 J82
Abstract: Two experiments were conducted to determine 1) the prolactin response to different kinds of feedstuffs in stallions and 2) the effects of total feed deprivation on prolactin secretion in mares and its interaction with the prolactin response to feeding. Experiment 1 was performed with stallions as a 6 X 6 Latin square: A) no feed; B) pelleted feed fed to meet 82.5% of the horses' CP requirements; C) pelleted feed at 25% of the amount in B; D) pelleted feed as in B plus water ad libitum; E) cracked corn at the weight in B; and F) chopped alfalfa at the weight in B. The positive prolactin responses (P < .05) to feeding were similar for treatments B through F. The insulin response to feeding was highest (P <.05) in stallions fed water with the pelleted feed. In Exp. 2, 72 h of feed deprivation did not affect (P > .1) daily prolactin secretion. Feeding of a meal on the 3rd d of deprivation increased (P < .05) plasma prolactin, insulin, and glucose concentrations similarly in all mares. There was a positive growth hormone response (P < .1) after feeding in feed-deprived mares but not in fed mares. The prolactin response (P <.001) to thyrotropin-releasing hormone was greater (P = .083) for feed-deprived mares than for controls, whereas the response to sulpiride (P < .001) only tended to differ (P = .16) between groups. We conclude that prolactin secretion may be stimulated by aspects of eating other than the feedstuff itself. Total feed deprivation had little effect on the subsequent prolactin response to a meal or to other known secretagogues.
Descriptors: stallions, starvation, pelleted feeds, drinking water, mares, blood plasma, prolactin, insulin, blood sugar, fatty acids, maize, alfalfa, thyrotropin releasing hormone.

Descriptors: horses feeding and feeds, horses exercise, Thoroughbreds.
Notes: Thesis (Ph. D.)--University of Kentucky, 1999.

NAL Call Number: SF955.E6
Abstract: Eight Thoroughbred horses were used to determine the effects of long-term calorie restriction and diet composition on serum T4 and T3 concentrations and metabolic responses with exercise. Horses were randomly assigned to 2 treatment groups (n = 4): Group 1, horses were fed a calorie-restricted diet designed to have 70% of the calories from the roughage source (RHR); Group 2, horses were fed a calorie-restricted diet designed to have 70% of the calories from the concentrate source (RHC). Horses then completed 2 step-wise exercise tests; one following a 12 h fast and one 2 h after a meal of 2 kg of a grain mix. Glucose concentrations declined (P < 0.01) in fed horses on the RHR diet but did not change in fed horses on the RHC diet. Fasted horses receiving the RHR diet had a more rapid increase in glucose concentration during exercise compared to fasted horses
receiving the RHC diet (P < 0.01) as well as the highest glucose concentration at fatigue (P < 0.05). Insulin concentrations were higher (P < 0.05) at fatigue in fed horses on the RHR diet. Fasted horses receiving the RHR diet had higher (P < 0.01) pre-exercise FFA concentrations and a more rapid decline (P < 0.01) in FFA during exercise. Serum T3 concentrations increased (P < 0.01) in response to exercise within all treatments. The differences in thyroid hormone, glucose and FFA responses to exercise suggest that calorie source may be important in the hormonal regulation and energy metabolism of horses consuming calorie deficient diets.

Descriptors: food deprivation, thyroid hormones, fatty acids, heart rate, insulin, muscle fatigue, Thoroughbreds, effects of long-term calorie restriction, composition of diet, serum T4 and T3 concentrations, effects of exercise.


NAL Call Number: 49 J82

Abstract: The metabolic effects of short-term feed restriction and dietary calorie source were studied in horses receiving high-roughage or high-concentrate diets. Four Thoroughbred geldings were assigned to four treatment groups in a 4 x 4 Latin square experiment. The four treatments were 1) a nutritionally adequate high-roughage ration (70% roughage, 30% concentrate; AHR), 2) a nutritionally adequate high-concentrate ration (40% roughage, 60% concentrate; AHC), 3) 70% of the intake of the AHR diet (RHR), and 4) 70% of the intake of the AHC diet (RHC). Diets AHR and AHC were designed to meet the caloric need of horses undergoing moderately intense work. Blood samples were taken on the first 7 d of each period for analysis of serum T4 and T3 concentrations. On d 9 of each feeding period, each horse was fed 1.0 kg of oats as the morning meal. Jugular blood was sampled before and immediately after, as well as at 30 min after, completion of the meal and subsequently every hour for 7 h. Daily serum T4 and T3 concentrations were not affected by day, feeding level, or diet composition. Meal feeding produced an increase (P < 0.01) in T4 and T3 concentrations when horses were adapted to the AHR and AHC diets but not the RHR or RHC diets. Thyroxine concentrations were lowest (P < 0.05) when horses were adapted to the AHC diet. Glucose (P < 0.05), insulin (P < 0.01), and NEFA (P < 0.01) concentrations were higher in response to the meal when horses received RHR than for the other diets. These results indicate that nutrient restriction alters responses to meal feeding in horses and that this response may also be affected by the dietary roughage:concentrate ratio.

Descriptors: horses, restricted feeding, diets, roughage, hay, oats, blood serum, l thyroxine, triiodothyronine, blood sugar, blood lipids, fatty acids, insulin, digestive absorption, body weight.


NAL Call Number: 49 J82

Descriptors: horses, feed management, effects of feed deprivation, endocrinology.

Notes: Meeting Information: Meeting of the American Society of Animal Science, Southern Section, Orlando, Florida, USA; February 01-06, 2002.


NAL Call Number: 49 J82

Abstract: Sixteen light horse mares (8 to 9 yr of age; 457 to 579 kg BW) were fed Bermudagrass hay and a corn/cottonseed hull-based supplement formulated to contain either 100% (control) or 50% (restricted) of the protein and(or) energy requirements for maintenance in a 2 X 2 factorial arrangement of treatments. Daily measurements of intake, BW, and plasma hormones and metabolites were made for 33 d. Plasma glucose, insulin, NEFA, and urea N were measured in hourly samples drawn on d 27, and parallel with an i.v. glucose tolerance test (IVGTT) and epinephrine challenge on d 29. Energy restriction increased daily NEFA concentrations (P < .001) and urea N (P = .013), whereas protein restriction decreased (P = .002) urea N concentrations. These effects of protein and energy restriction occurred within 24 h and were consistent (day effect, P > .1) throughout the remaining 24 d. Normal meal consumption elevated plasma glucose, insulin, and urea N concentrations (time effect, P < .08). Plasma NEFA concentrations did not change after feeding in mares fed control energy, but decreased in mares fed restricted energy (energy X time interaction, P = .005). After
IVGTT, areas under the curve for plasma glucose and insulin were smaller in mares fed restricted protein (P < .05), whereas glucose area was larger in mares fed restricted energy (P = .009). After epinephrine injection, energy restriction increased the initial magnitude of the NEFA response, but after 50 min, reduced plasma NEFA below pre-injection concentrations (energy X time interaction, P = .06). We conclude that metabolic responses occur within 24 h of dietary changes and that plasma constituents are altered by protein and(or) energy restriction. during feeding, glucose, and epinephrine challenges.

**Descriptors:** mares, restricted feeding, energy intake, protein intake, body weight, blood sugar, blood plasma, insulin, fatty acids, urea, glucose tolerance, epinephrine.


**Abstract:** Twelve light horse mares were fed a control diet that provided 100% of their maintenance protein and energy requirements for 7 d and were then either continued on the control diet or totally deprived of feed (with access to water) for 3 d. Plasma samples were drawn twice daily throughout the experiment, at 15-min intervals for 9 h beginning 45 h after feed removal, and at 10-min intervals around an exercise bout beginning 73 h after feed removal. Feed deprivation increased (P < .06) whole blood beta-hydroxybutyrate and plasma NEFA, urea N, L-lactate, and glucagon concentrations, decreased (P = .02) IGF-I concentrations, and did not change (P > .1) plasma glucose, insulin, prolactin, triiodothyronine, and thyroxine concentrations. Exercise increased (P < .05) plasma NEFA, prolactin, and growth hormone (GH) concentrations in all mares. Plasma NEFA concentrations increased (P < .001 ) after exercise and remained increased in fed mares, but rapidly decreased in deprived mares (time X diet interaction, P = .006). Plasma glucose concentrations following exercise increased in deprived mares but decreased in fed mares (time X diet interaction, P = .07). The plasma prolactin response after exercise also differed between groups (P = .09). Feed-deprived mares had greater (P = .02) plasma GH concentrations before exercise (73 h after feed withdrawal) and had a greater (P < .001) GH peak at 10 min after initiation of exercise. The increase in secretion rate of GH due to feed deprivation in these mares was similar to that reported for other domestic species but was not nearly as great in magnitude.

**Descriptors:** mares, starvation, duration, blood plasma, exercise, fatty acids, urea, lactic acid, glucagon, insulin like growth factor, blood sugar, prolactin, hydrocortisone, somatotropin, thyroid hormones.


**NAL Call Number:** 448.8 J8293

**Descriptors:** horses, skeletal muscle, effects of food supply, effects of training, blood chemistry, endocrine system, growth.

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Age Specific Nutrition

Descriptors: complications, diets, foals, horse feeding, newborn animals, nutrients, nutritional support, parenteral feeding, therapy, horses.

NAL Call Number: 49 J82
Abstract: Three experiments tested the hypotheses that daily cortisol rhythm, feeding time, and/or insulin infusion affect(s) leptin secretion in stallions. Ten mature stallions received ad libitum hay and water and were fed a grain concentrate once daily at 0700. In Exp. 1, stallions received either a single injection of dexamethasone (125 [micro]g/kg BW i.m.; n = 5) or vehicle (controls; n = 5) at 0700 on d -1. Starting 24 h later, blood samples were collected every 2 h for 36 h via jugular venipuncture. Cortisol in control stallions varied (P < 0.01) with time, with a morning peak and evening nadir; dexamethasone suppressed (P < 0.01) cortisol concentrations. Leptin and insulin were greater (P < 0.01) in the treated stallions, as was the insulin response to feeding (P < 0.01). Leptin in control stallions varied (P < 0.01) in a diurnal pattern, peaking approximately 10 h after onset of eating. This pattern of leptin secretion was similar, although of greater magnitude (P < 0.01), in treated stallions. In Exp. 2, five stallions were fed the concentrate portion of their diet daily at 0700 and five were switched to feeding at 1900. After 14 d on these regimens, blood samples were collected every 4 h for 48 h and then twice daily for 5 d. Cortisol varied diurnally (P = 0.02) and was not altered (P = 0.21) by feeding time. Insulin and leptin increased (P < 0.01) after feeding, and the peaks in insulin and leptin were shifted 12 h by feeding at 1900. In Exp. 3, six stallions were used in two 3 x 3 Latin square experiments. Treatments were 1) normal daily meal at 0700; 2) no feed for 24 h; and 3) no feed and a bolus injection of insulin (0.4 mIU/kg BW i.v.) followed by infusion of insulin (1.2 mIU[kg BW-1][bullet]min-1) for 180 min, which was gradually decreased to 0 by 240 min; sufficient glucose was infused to maintain euglycemia. Plasma insulin increased (P < 0.01) in stallions when they were meal-fed (to approximately 150 [micro]IU/mL) or infused with insulin and glucose (to approximately 75 [micro]IU/mL), but insulin remained low (10 [micro]IU/mL or less) when they were not fed. The increases in insulin were paralleled by gradual increases (P < 0.01) in leptin concentrations 3 to 4 h later in stallions fed or infused with insulin and glucose. When stallions were not fed, leptin concentrations remained low. These results demonstrate that feeding time, and more specifically the insulin increase associated with a meal, not cortisol rhythm, drives the postprandial increase in plasma leptin concentrations in horses.
Descriptors: horses, plasma leptin concentration, insulin, daily cortisol rhythm, dexamethasone, feeding time, stallions.

Descriptors: growing horses, nutrition, canola meal, soybean meal, performance, blood parameters, concentrates.
Language of Text: Portuguese.

Descriptors: horses, foals, weaning, concentrate, supplements, Mangalarga Marchador, Brazilian horse breed.
Language of Text: Portuguese.

Descriptors: growing horses, nutrition, high moisture corn silage, growth, performance, corn grain alternatives.
Language of Text: Portuguese.

Abstract: The work deals with the main principles of the proper nutrition of foals based both on earlier practical experiences and present knowledge. In relation to the prevention of health disorders it relates to the problems within the periods of the colostral and milk nutrition to the questions of artificial raising of foals and the principles of proper weaning and post-weaning of foals.
Descriptors: foal nutrition, experience and scientific knowledge, health disorders, colostrum, milk nutrition, artificial rearing of foals, weaning.
Language of Text: Slovak.

NAL Call Number: 447.8 J82
Descriptors: horses, Fick principle, tracer method, fetal foals, nutrition, gestational stages, umbilical bloodflow, umbilical oxygen uptake, fetal glucose use, umbilical lactate uptake.

NAL Call Number: 49 J82
Abstract: Matua bromegrass hay (Bromus willdenowii Kunth) is a high quality forage, but its value for mares during gestation and lactation is not well known. Intake, rate of passage, performance, and reproduction by gestating and lactating Quarter Horse mares fed the hay was investigated. In this experiment, 12, 2- to 12-yr-old gravid mares (mean BW = 553 kg; SD = 36) were fed Matua hay (CP = 11.5%) or alfalfa hay (Medicago sativa L.) (CP = 15.4%) for variable days prepartum (mean 59.9 d; SD = 23.5) and for 70 d postpartum. Matua and alfalfa hay were fed as the roughage portion of the diet with a grain supplement. Mares, blocked by age,
expected date of foaling, and BW, were assigned randomly within blocks to treatments (six mares per treatment). Forage type did not affect intake, gestation length, birth weight, number of foals, foal weight gain, day of first postpartum ovulation, cycles per conception, or pregnancy rate at 70 d. On d 1, milk from mares fed alfalfa hay contained less (P < 0.03) CP than milk from mares fed Matua hay. Milk CP decreased (P < 0.01) in all mares over time. In a separate experiment, voluntary intake and rate of passage of Matua (CP = 15.5%), alfalfa (CP = 24.9%), and Timothy (Phleum pratense L.) (CP = 4.1%) hays were determined in nine 2-yr-old pregnant mares (mean BW = 447 kg; SD = 21). Diets were 100% forage. Timothy hay did not meet CP requirements for mares. Voluntary intake of alfalfa hay was higher (P < 0.01) than Matua hay. Intake of Timothy hay was lower (P < 0.01) than the mean of alfalfa and Matua hay. Rate of passage of forage was measured by passage of Cr-mordanted fiber. Passage rate and retention time did not differ between Matua and alfalfa hay; however, the retention times of Matua and alfalfa hays were shorter (P < 0.01) than for Timothy hay. Our results indicate that Matua hay is a forage that can be used safely for mares during gestation and early lactation and for their young foals.

Descriptors: mares, lactation, fodder crops, feed intake, digestion, performance, sexual reproduction, Bromus catharticus, alfalfa hay, foaling, liveweight, twinning, foals, liveweight gain, conception rate, pregnancy rate, mare milk, transit time, timothy hay, matua hay, Phleum pratense L., Medicago sativa L.

Guillaume, D., G. Duchamp, J. Salazar Ortiz, and P. Nagy (2002). Nutrition influences the winter ovarian inactivity in mares. Theriogenology 58(2-4): 593-597. ISSN: 0093-691X.

Descriptors: horses, mares, nutrition, seasonality, endocrine function, reproduction, ovulation, chemeostasis, lactation.

NAL Call Number: SF951.E62
Descriptors: mares, lactation, fodder crops, feed intake, digestion, performance, sexual reproduction, Bromus catharticus, alfalfa hay, foaling, liveweight, twinning, foals, liveweight gain, conception rate, pregnancy rate, mare milk, transit time, timothy hay, matua hay, Phleum pratense L., Medicago sativa L.

Descriptors: nutritional requirements, geriatric horses, aging, animal health, biological development, physiological requirements.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To determine effects of prior feeding on pharmacokinetics and estimated bioavailability of orally administered microencapsulated erythromycin base (MEB) in healthy foals. ANIMALS: 6 healthy foals, 3 to 5 months old. PROCEDURE: Foals were given 2 doses of MEB (25 mg/kg of body weight, PO). One dose was administered after food was withheld overnight, and the other was administered after foals had consumed hay. The study used a crossover design with a 2-week period between doses. Blood was collected via a jugular vein prior to and at specific times after drug administration. Concentrations of erythromycin A and anhydroerythromycin A in plasma were determined, using high-performance liquid chromatography. Results pharmacokinetic analysis of plasma concentration-time data for food-withheld and fed conditions were compared. RESULTS: Plasma concentrations of erythromycin A for foals were lower after feeding than concentrations when food was withheld. Area under the plasma concentration-time curve, maximum plasma concentration, and estimated bioavailability were greater in foals when food was withheld than when foals were fed. Anhydroerythromycin A was detected in plasma after administration of MEB in all foals. CONCLUSIONS AND CLINICAL RELEVANCE: Foals should be given MEB before they are fed hay. Administration of MEB to foals from which food was withheld overnight apparently provides plasma concentrations of erythromycin A that exceed the minimum inhibitory concentration of Rhodococcus equi for approximately 5 hours. The dosage of 25 mg/kg every 8 hours, PO, appears appropriate.

Descriptors: microencapsulated erythromycin base (MEB), anti-bacterial agents, administration of
erythromycin, foals, feeding of hay, withholding fee prior to administration of MEB.


NAL Call Number: 49 J82

Abstract: Sixteen 20- to 26-yr-old mares were given 0, 6.25, or 12.5 mg/d equine somatotropin (eST) to determine whether aged mares respond to ST with changes in feed intake, body weight, body condition score (based mostly on fat cover), or immunocompetence. Neither dry matter intake, body weight, nor body condition scores were altered during the 6 wk of eST injection. However, based on photographs taken to evaluate musculature before and after treatment (scores 0 to 4), mares given eST developed greater (P <.07) muscle definition (1.8 +/- .6 and 2.5 +/- .6 for 6.25 and 12.5 mg eST/d, respectively) than control mares (.7 +/- .4). Total circulating leukocytes increased (P < .05) in both of the eST-treated groups during the 6-wk injection period, caused by an increase (P <.05) in granulocytes. Lymphocyte numbers were not altered. Granulocyte oxidative burst activity was not altered by eST treatment. Although lymphocyte proliferative responses to phytohemagglutinin, poke-weed mitogen, or lipopolysaccharide were not altered during the treatment period, lymphocyte proliferation in response to phytohemagglutinin and pokeweed mitogen increased twofold in eST-treated horses at 2 wk after eST treatment. In overview, the increased musculature and the increase in granulocyte numbers in mares given eST suggest that eST supplementation may improve the health and well-being of aged mares.

Descriptors: mares, somatotropin, feed intake, body weight, body condition, muscles, lymphocyte transformation, blood picture, dosage, dry matter, leukocyte count, oxidation, granulocytes.


NAL Call Number: SF810.V4

Abstract: Three groups of foals were raised under different management programs in this study: Group 1 (n = 6) and Group 2 (n = 6) were raised with their dams on pasture; Group 3 foals (n = 5) were raised under parasite-free conditions. Mares and foals of Group 1 received daily pyrantel tartrate (PT) treatment with their pelleted feed ration, whereas mares and foals of Groups 2 and 3 received only the pelleted ration. Pasture-reared foals were weaned and moved to a heavily contaminated pasture for 5 weeks. Group 1 foals continued to receive daily PT treatment whereas Group 2 foals received only the pelleted feed ration. Following this period, all foals were moved into box stalls. Half of each group was challenged with 10(3) Strongylus vulgaris infective third-stage larvae (L3), 5 x 10(3) Strongylus edentatus L3 and 10(5) mixed cyathostome L3; the remaining half served as unchallenged controls. Necropsy examinations were performed 6-week post-challenge for evaluation of parasite burdens and lesions. Daily PT treatment of Group 1 reduced the patent cyathostome infections of both mares and foals and was effective in reducing pasture burdens of infective larvae. Daily treatment of Group 1 foals during weaning continued to suppress EPG levels; however, it did not prevent large strongyle infections during the weaning period. Group 1 foals were more sensitive to challenge than Group 2 foals, which did not exhibit any post-challenge disturbances. Group 1 foals were equally susceptible to challenge as parasite-free foals.

Descriptors: foals, mares, antinematodal, intestinal mucosa, pyrantel, strongyl infections, Strongylus vulgaris, Strongylus edentatus, feces parasitology, ivermectin, larva, parasite egg count, cyathostome infections.


NAL Call Number: SF951.J65

Descriptors: dietary fats, feeding habits, feeding frequency, growth of young horses, biological development, feed intake, energy metabolism, supplements, hay, nutrient intake.


Descriptors: foals, horse feeding, energy balance, energy intake, energy metabolism, feces, urine, energy expenditure, metabolizable energy, milk substitutes, total parenteral nutrition, mare milk, body weight, age differences.


Descriptors: nutrition, feeding regimen, nutritional management, pathogenisis, orthopedic disease, bone disease, lameness, mineral deficiency, nutrient balance.


Descriptors: growing horses, nutritional utilization, diet composition, soybean hulls, Tifton 85 hay, alternative feeds.

Language of Text: Portuguese.


Abstract: The effects of diet supplementation with live yeasts (20 g/head d) on feed digestibility and sperm quality of stallions were evaluated. The results showed a slight positive effect, not statistically significant, on digestibility during the first month of administration. The effects on quantitative and qualitative traits of semen were more interesting: sperm was better in treated group during 2 months following the interruption of treatment: volume ml 47 +/- 9 vs 34 +/- 5, concentration 10^[6]/ml 575 +/- 806 vs 416 +/- 39, live spermatozoa 83 +/- 5 % vs 65 +/- 29 % (P<0.05).

Descriptors: stallions, animal feeding, dietary supplements, yeasts, feed digestibility, semen quality, probiotics, nitrogen retention, feed conversion efficiency.

Language of Text: Italian with an English summary.


NAL Call Number: SF951.V47

Abstract: Little is known regarding nutrient requirements and feeding of geriatric horses, and more effort should be placed on this area of equine nutrition research. That which is known suggests that some geriatric horses may not have different requirements than other mature horses, whereas others affected by disease or poor dentition may have special nutritional needs. In general, rations for geriatric horses should be based on high-quality roughage supplemented with complementary minerals and vitamins. The need for additional energy aside from that provided by the forage can be supplied by adding energy concentrates, such as cereal grains or fat, to the ration. Processing techniques involving heat, such as pelleting and extruding, are advised when cereal grains are included in the ration so as to improve starch digestibility in the small intestine and avoid starch overload in the hindgut and its subsequent problem (ie, colic, laminitis). In addition, the environment in which geriatric horses are fed should be one that promotes ease of ration consumption and eliminates factors that impair feed
consumption, such as competition from other horses and the need to travel relatively long distances (eg, grazing marginal pastures). Finally, strict attention should be paid to the body condition of geriatric horses so as to evaluate adequacy of the ration and the general health of the horse.

Descriptors: geriatric horses, nutrient requirements, feeding, nutritional requirements, provision of high-quality roughage, mimization of competition for feed with other horses, body condition scoring, general horse health, aged horses.

NAL Call Number: 44.8 J822
Descriptors: feeding practices, plasma glucose levels, concentrates, young horses, meeting abstract.

NAL Call Number: QH301.N388
Abstract: The preference tests involved granulated feed mixtures with the following flavour additives made by ETOL, Slovenia: Lucerne (Flavour 12021), hay (Flavour 12023), vanilin (Flavour12017). Horses were interested in flavoured feed after a 4-day adaptation period. Using additives of hay or lucerne flavour in a feed mixture used for feeding stallions had a favourable influence on the intake. It was also found that additives of vanilin Flavour 12017 and of lucerne Flavour 12021 had a favourable influence on the intake of nutritive fodder.
Descriptors: preference testing, granulated feed mixtures, Lucerne, hay, vanilin, flavored feed, stallions, effect of feed additives on intake of nutrient fodder, feed additives, feeding preferences.

NAL Call Number: QH301.N388
Abstract: Flavour additives in the nutrition of foals have got a limited influence on the intake of nutritive fodder. The addition of examined flavour preparations to the feed mixtures used in the nutrition of 2 month old suckling foals did not have any effect on the intake of feed. The foals at the age from 2 to 5 months showed an increased intake of the nutritive fodder, with the addition of milk flavour in particular, and the mixtures with vanilin flavour.
Descriptors: flavor additives in feed, foal nutrition, feeding preferences, effect of flavor on feed intake, nutritive fodder, milk flavor, lucerne, milk, hay, vanillin, foal nutrition.

NAL Call Number: SF105.A1Z8
Descriptors: horses, puberty, sexual development, effects of feeding practices, restricted feeding.

Descriptors: age, animal nutrition, body condition, fetal development, fetal growth, fetus, mares, placenta, plane of nutrition, pregnancy, Thoroughbred, horses.


**Descriptors:** horses, pregnant mares, nutrition, reproductive system, endophyte infected tall *Fescue* plants, toxicology.

**Notes:** Meeting Information: Joint Annual Meeting of the American Dairy Science Association, the American Society of Animal Science and the Mexican Association of Animal Production, Phoenix, Arizona, USA; June 22-26, 2003.
Nutrition Concentrates


Descriptors: in vitro hind gut fermentation tests, processing of sorghum grain, starch digestion, gastrointestinal tract.


Descriptors: Standardbred horses, racehorses, oats, lipid content, digestibility, performance related to high fat diet, animal feeding, nutritive value.

Language of Text: Swedish.

Notes: Examensarbete - Sveriges Lantbruksuniversitet, Institutionen foer Husdjurens Utrodring och Vaard (Sweden). no. 72.


Descriptors: evaluation methods, non-linear pasage model, total tract retention time, hindgut fractional passage rates, hay, concentrates, effect of caecal cannulation on passage parameters.


Online: www.pointveterinaire.com

Descriptors: allergic inflammatory diseases, heaves, organic dust inhalation, prevention and treatment methods, risk factors.


Descriptors: nutrition, sunflower oilmeal, soybean oilmeal, diet composition, crude protein, neutral detergent fiber, dry matter, acid detergent fiber, ether extracts, digestion.

Language of Text: Portuguese with an English summary.
NAL Call Number: 450 M994

**Abstract:** This article reports an outbreak of intoxication of female horses with *Claviceps purpurea* in southern Brazil. The outbreak affected twelve pregnant mares which were fed with black oat (*Avena strigosa*) during the pre-delivery period. Underdevelopment of the mammary gland in the pre-delivery period resulting in post-delivery agalactia was the most pronounced finding. These mares delivered weak and unviable foals, which showed no suckling reflex and died within a few hours of birth. Laboratory analysis of oat samples fed to the animals resulted in the identification of *Claviceps purpurea sclerotia*. The fungus was identified in 0.22% of the examined seeds.

**Descriptors:** *Avena sativa*, black oat, horse diseases, feed toxins, *Claviceps purpurea*, Brazil, pregnant mares, agalactia, underdevelopment of mammary gland, weak and unviable foals, fungus in seeds.

NAL Call Number: SF955.E6

**Abstract:** High-grain diets for the exercising horse were compared with diets which provided 15% of the total caloric intake from either vegetable oil or a highly fermentable fibre source (beet pulp). Six Thoroughbreds age 3 years were fed one of 3 diets or 5 weeks in a replicated 3 x 3 Latin square. The CONTROL diet was 3.65 kg of sweet feed (SF), 0.9 kg of a protein/vitamin/mineral pellet and 5.45 kg of hay cubes. The FAT diet replaced 1.15 kg of SF with 0.45 kg of soybean oil and the FIBRE diet replaced 1.15 kg of SF with 1.36 kg of beet pulp. Horses were exercised 3 times per week on a high-speed treadmill. During the last week of each period, the horses performed a standardised exercise test (SET). A series of blood samples was drawn immediately before feeding and every 0.5 h for 3 h after feeding, throughout the exercise bout and 30 min post exercise. Plasma was analysed for lactate, glucose, cortisol, insulin, packed cell volume, total protein and triglycerides. Water intake was measured at regular intervals during SET day. Blood glucose was lower (P < 0.05) in the FAT-fed horses during the 3 h post feeding as compared to either CONTROL or FIBRE-fed horses. Insulin was lower (P < 0.05) in the FAT-fed both post feeding and throughout exercise. Cortisol was lower (P < 0.05) in the FAT than the CONTROL-fed during exercise. Following exercise, the FAT-fed drank more water (P < 0.01) than either CONTROL or FIBRE-fed. Substituting 15% of DE as vegetable oil had a greater effect on metabolic response to exercise than a 15% substitution of beet pulp.

**Descriptors:** energy metabolism, physical conditioning, dietary fats, vegetable oil, beet pulp, blood glucose levels, insulin, cortisol, water intake, effects of exercise, Thoroughbreds.


**Descriptors:** crude protein, diets, digestibility, dry matter, energy digestibility, fiber, mare feeding, mares, organic matter, pods, woody plants, horses, plants, *Prosopis juliflora*.

**Language of Text:** Portuguese with an English summary.


**Descriptors:** horse diets, canola meal as an alternative protein source, soybean meal, crude protein alternatives, nutrient digestibility, isoproteic diets, isocaloric diets, fecal analysis.

**Language of Text:** Portuguese.

To investigate the influence of overweight and dietary fat supplementation on lipid and insulin glucose metabolism of Shetland ponies, eight Shetland pony geldings were fed a hypercaloric (30 MJ DE/150 kg bwt. and day) fat diet (10% fat as soybean oil) or a carbohydrate control diet for nine months until ponies gained an overweight of 15%. Afterwards oral glucose tolerance tests (oGTT; 5, 6 mmol/kg bwt.) were performed after a 12 hour fast and after a fast which led to an increase of plasma triglyceride concentrations to a threshold of 3 mmol/l (36-65 hrs.). Plasma concentrations of glucose, insulin, triglycerides and non esterified fatty acids (NEFA) were determined for 480 minutes after the glucose load. Ponys having had received the control diet tended to a higher insulin secretion in case of both oGTTs, whereas the glucose tolerance was similar in both groups but lower than in ponies of normal weight. During the oGTTs after fasting leading to the plasma triglyceride threshold, triglyceride concentrations decreased significantly (p < 0.05) faster and stronger in fat fed ponies. Additionally, fat fed pony showed significantly (p < 0.05) lower NEFA levels. The results of this study demonstrate a positive effect of fat feeding on the triglyceride clearance of overweight Shetland ponies.

Descriptors: dietary fat, overweight ponies, Shetland ponies, hypercaloric fat diet, carbohydrate control diet, oral glucose tolerance tests, triglyceride clearance, fat feeding.

Language of Text: German.
glucose concentrations to be lower and the insulin responses higher (nonsignificant) in the S treatment group. No significant effect of treatment on haematological parameters, monitored monthly, was found. Total protein and gamma glutamyl transferase remained within the normal range throughout. There was a significant effect of treatment (P < 0.05) on cholesterol and triglycerides with higher concentrations in the S group from the first (1 month) sample. Linoleic acid was the main fatty acid in all the 4 plasma lipid classes with slightly, but significant (P < 0.05), higher concentrations in Un for the cholesterol ester and phospholipid classes. There was no effect of time. Overall, the total resting plasma fatty acid content was significantly higher (P < 0.05) with S at the sample points (endAC and endHF). No adverse effects of feeding either diet on apparent coat condition or hoof appearance were seen apart from an apparent increase in the grease score. Many of the parameters assessed showed significant improvements with time (P < 0.05). In conclusion, no apparent adverse effects of feeding a diet supplemented with either an unsaturated or saturated vegetable oil for 6 months at approximately 20% DE after 10 months at approximately 12% DE were identified and there were no apparent disadvantages of feeding a saturated vegetable oil supplemented diet compared with an unsaturated one.

Descriptors: vegetable oil, Thoroughbreds, effects of sweet feed, timothy hay, oats, oral glucose tolerance tests, exercise, hoof and coat condition, comparison of saturated and unsaturated vegetable oil.

NAL Call Number: SF1.L5
Descriptors: horses, feed intake, concentrates, distillers' residues, feeding behavior, ingredients, ingestion.

NAL Call Number: SF51.P76
Descriptors: horses, forage evaluation, forage quality, forage composition, literature reviews.

NAL Call Number: 49 J82
Descriptors: horses, nutrition, nutrient digestibility, alfalfa cubes, fermentation, cereal grains, supplements.

NAL Call Number: SF774.J68
Descriptors: horses, barley, vomitoxin, toxicity, susceptibility, deoxynivalenol contamination.

NAL Call Number: SF1.L5
Descriptors: oats, grass hay, digestibility, hay:oat ratios, feeds, dry matter, digestible energy, nutrient availability, urine analysis, digestive tract.

NAL Call Number: 41.8 R3224
Abstract: Exposure of a group of horses to tetracycline-contaminated feed resulted in acute colitis and subsequent death in one horse and milder diarrhea in 3 others. The most severely affected animal demonstrated clinical and pathological findings typical of colitis X. The other herdmates responded well to administration of zinc bacitracin.
Descriptors: tetracycline poisoning, acute colitis pathology, diarrhea, fatal outcome of food contamination, horses, zinc bacitracin.

Descriptors: horses, feeding, management practices, digestion, digestive system, amount of concentrates.


Descriptors: horses, nutrition, feeding practices, corn alternatives, pelleted citrus pulp.

Language of Text: Portuguese.


Descriptors: feeding horses, fats, oils, digestibility, supplements, lipid content, digestive absorption, blood composition, triglycerides, cholesterol, phospholipids, free fatty acids, microbial flora, nutrient availability, feeding behavior, energy metabolism.

Language of Text: German.


Descriptors: diet composition, nutritive value, processed oat grains, digestibility, fiber-rich concentrates, resistant starch content, in vitro organic matter digestibility, digestive passage kinetics, effects of feed processing, resistant starch content, energy and protein value prediction, degradation profiling.

Notes: Special Issue.


NAL Call Number: 49 J82

Abstract: An experiment was conducted to determine the effect of feeding blends of grains naturally contaminated with Fusarium mycotoxins to mature, exercised horses, and to test the efficacy of a polymeric glucomannan mycotoxin adsorbent (GM polymer) in preventing Fusarium mycotoxicoses. Six mature, mixed-breed mares with an average BW of 530 kg were assigned to one of three dietary treatments for 21 d in a replicated 3 x 3 Latin square design. Feed consumed each day was a combination of up to 3.5 kg of concentrates and 5.0 kg of mixed timothy/alfalfa hay (as-fed basis). The concentrates fed included 1) manage; 2) blend of contaminated grains; and 3) contaminated grains + 0.2% GM polymer (MTB-100, Alltech Inc., Nicholasville, KY). Concentrates containing contaminated grains averaged 11.0 ppm deoxynivalenol, 0.7 ppm 15-acetyldeoxynivalenol, 0.8 ppm zearalenone, and 0.8 ppm zearealenone (as-fed basis). Feed intake and BW were monitored over a 21-d period. Horses were maintained on a fixed exercise schedule throughout the experiment. At the end of the experiment, each horse completed a time-to-fatigue treadmill step test. Variables measured during pretest, each step of the test, and 5 and 10 min posttest were as follows: 1) time-to-fatigue, 2) heart rate, 3) hematological variables, and 4) serum lactate concentration. Each step consisted of 2 min of fast trot with a 2% increase in incline after each 2 min. Feed intake by horses fed contaminated grains was decreased compared with controls throughout the experiment (P < 0.05). Supplementation of 0.2% GM polymer to the contaminated diet did not alter feed intake by horses compared with those fed the unsupplemented contaminated diet. All hay was consumed regardless of concentrate fed. Weight loss from 0 to 21 d was observed in horses fed contaminated grains compared with controls (P < 0.05). No effect of diet was seen on variables used to measure athletic ability, although the results showed an expected response to exercise for a fit horse. We conclude that exercised horses are susceptible to Fusarium mycotoxicoses as indicated by appetite suppression and weight loss.

Descriptors: horses, feeding, concentrates, effects of exercise, clinical signs of contamination, natural Fusarium mycotoxins.


**NAL Call Number:** TP670.F472

**Descriptors:** horse nutrition, metabolism, fat content, metabolites, hormones, hyperlipidemia, Shetland ponies, meeting abstract.

**Language of Text:** German and English.

**Notes:** Meeting Information: 52nd International Congress of the German Society for the Study of Lipids, Magdeburg, Germany; September 13-15, 1998.


**Descriptors:** digestibility analysis, processed oats, untreated oats, hulled oats, autoclave-processed oats, autoclave-processed hulled oats, Dantoaster-processed oats, Dantoaster-processed hulled oats, dry matter, organic matter, crude fat.

**Notes:** Meeting Information: Nutritive Value of Concentrates in Horses. Papers presented at the 54th EAAP meeting, Rome, Italy, 2003.


**NAL Call Number:** 41.8 Z5

**Descriptors:** blood plasma, metabolites, dietary fat, feed intake, energy intake, energy content, feed supplements, lipid metabolism, triacylglycerols, lipoprotein lipase, insulin, glucose tolerance, Shetland ponies.


**NAL Call Number:** 49 J82

**Abstract:** Plasma concentrations of glucose and insulin following a meal were compared in twelve Thoroughbred mares fed a pelleted concentrate (PC), a traditional sweet feed high in sugar and starch (SS), or a feed high in fat and fiber (FF). The feeds had similar DE and CP but differed in fat (19, 32, and 166 g/kg DM, respectively), NDF (199, 185, and 369 g/kg DM, respectively) and nonstructural carbohydrates (574, 645, and 247 g/kg, respectively). Mares were randomly assigned to two groups balanced for foaling date and weight. All mares received PC in late gestation; then, after foaling, one group was fed SS and the other FF for trials in early and late lactation. Mares were placed in stalls and deprived of feed overnight. A series of blood samples was collected via a jugular catheter from 0 (baseline) to 390 min after consumption of 1.82 kg of feed. Plasma was analyzed for glucose and insulin. Baseline values, peak values, and areas under curves (AUC) were compared by ANOVA. Baseline values were 74.7 +/- 10.9 mg/dL for glucose and 5.86 +/- 1.80 mIU/L for insulin for all diets and stages. Responses to PC did not differ between the two groups (P > 0.34), indicating the groups were metabolically similar. Peak plasma glucose and insulin concentrations were higher (P < 0.001) in the SS group than in the FF group during early and late lactation. Similarly, glucose and insulin AUC were larger (P < 0.003) in SS than in FF during early and late lactation. These results indicate that metabolic fluctuations are moderated by the replacement of sugar and starch with fat and fiber. This replacement may reduce the risk of certain digestive and metabolic disorders that have been linked to feeding meals of grain-based concentrates to pregnant or lactating mares.

**Descriptors:** mares, blood sugar, glucose, blood plasma, insulin, pelleted feeds, starch, sugar, dietary fat, dietary carbohydrate, fiber, concentrates, digestible energy, pregnancy, metabolism, Thoroughbreds.


**NAL Call Number:** SF955.E6

**Abstract:** Our hypothesis was that, because horses have not evolved as fat eaters, there may be negative metabolic long-term effects of feeding a high fat diet. The objective of the present study was to identify these
long-term effects and compare them with the effects of isoenergetic long-term high starch feeding. This randomised block study with 20 exercised horses looked at the effect of feeding either a high starch (HS) or a high fat (HF) diet type in 3 periods during stabling (Stable 1), pasture, and stabling (Stable 2) over 390 days. The horses received a HS or HF concentrate, straw, hay and 6 h pasture/day in the pasture period. HF horses gained weight (2% of initial bwt) and, therefore, fat intake was reduced (from 1.43 to 0.88 g/kg bwt/day). Blood plasma glucose, total protein, albumins, gamma-globulins, free fatty acids, phospholipids and cholesterol concentrations were higher but urea concentration was lower with HF compared to HS feeding (P<0.05). Plasma concentrations of triglycerides, bilirubin and pre-beta lipoproteins were unaffected by the diet type. There were period effects (P<0.05) for all variables except triglycerides and pre-beta lipoproteins. In contrast to HS, in HF the quotient alpha/beta lipoproteins rose (P<0.05) throughout the stable periods and decreased (P<0.05) during 'pasture'. Glutamic acid dehydrogenase, gamma-glutamyl transferase, alkaline phosphatase, aspartate aminotransferase, creatine kinase and lactate dehydrogenase activity in sera were within the normal range. In conclusion, on the precondition that substantial bodyweight changes were prevented, no apparent adverse effects of long-term high fat feeding were identified and there were no apparent disadvantages of feeding on high fat compared with high starch diets.

Descriptors: long-term effects of high fat diets, horses, effects of high starch diets, lipoprotein concentrations, blood sampling, horse metabolism, weight gain, dietary carbohydrates.


Descriptors: horses, compound feeds, fats, soybean oil, feed intake, behavior, digestibility, nutrients, behavior, feeding habits, feeds, oils, plant oils, processed plant products, processed products, soybean products.

Language of Text: German.
Nutrition Roughages


Descriptors: horses, hay preference, proximate composition, crude fiber, chemical composition, feeding preferences, palatability, behavior, feeding habits, quality of roughage.


Abstract: Background - Grains are commonly fed to horses that have a high energy requirement. However, large quantities and fast consumption of grain can result in disorders such as laminitis, colic, tying-up, gastric ulcers and fractious behaviour. Thus, controlling the rate of grain intake is an important aspect in managing equine nutrition. Objectives - To measure the relationship between chaff quantity and length and the rate of intake of oats. Design - Each morning, six geldings (BW 479 +/- 18 kg) were fed a constant meal of oats at 3 g/kg bodyweight in combination with either longer ground wheaten chaff (4 cm), or short chopped wheaten chaff (< 2 cm) at one of five different addition rates in a random latin square design. Ryegrass/clover hay was provided each afternoon to meet maintenance energy requirements. Outcomes - Rate of intake varied with chaff quantity (P <0.001, ANOVA for repeated measures), but was not affected by chaff length. A maximal decrease in rate of intake occurred at the addition rate of 50% chaff. Conclusion - Relative to earlier studies a large amount of chaff was required to decrease rate of intake. It is not clear whether this is due to meal size, chaff type, or chaff processing method. Chaff length appeared to have no effect on rate of intake. However, the long chaff was ground and not chopped, which would have decreased the surface area and chewing required for ingestion. Further research is required to standardise a method of measuring rate of intake and to explore differences in chaff properties.

Descriptors: feeding grain to horses, rate of grain intake, chaff quantity and length, intake of oats, rate of intake.


NAL Call Number: 49 J82

Descriptors: hay substitute, soybean hulls, highly digestible fiber source, starch-free feed source, Quarter horse geldings, cannulated animals, cecal fermentation, equine diet formulations.


NAL Call Number: SF951.J65

Descriptors: horses, horse feeding, barley, cecum, colon, digesta, bacterial count, intestinal microorganisms, hay, pH, lactic acid, volatile fatty acids.

Descriptors: pectin, soybean meal, nutrient digestibility, apparent digestibility of dry matter, crude fiber utilization, neutral detergent fiber (NDF), acid detergent fiber (ADF), hemicellulose.

Language of Text: Portuguese.


NAL Call Number: SF95.A55

Descriptors: hay diet, tract digestibility, fiber digestion, chopped hay, pelleted hay, ground hay, digesta rate of passage.


NAL Call Number: SF1.L5

Descriptors: horses, sheep, nutrition, behavior, consumption preference, crude protein, cell wall content.


Descriptors: horses, mares, grazing behavior, feeding preference, forage variety.


NAL Call Number: SF277.J37

Descriptors: effect of exercise, energy digestion, timothy hay, alfalfa hay, young horses, two-year old horses, digestibility, digestible energy, comparison of energy digestibility between exercised and rested horses.


Descriptors: dietary roughage, feed intake, digestibility, indigenous organisms, Japan, Hokkaido native horses, grasses, feeding behavior.

Language of Text: Japanese.


Descriptors: grazing behavior, digestive system, forage intake, passage rate.


NAL Call Number: 44.8 J822

Descriptors: horses, roughage, alfalfa grass hay, feeding preference.


NAL Call Number: SF955.E6

Descriptors: management practices, feeding practices, factors contributing to colic, effect of meal size and
composition on gastric emptying, starch content, gastric ulcers.


NAL Call Number: 389.8 B773
Descriptors: digesta passage rate variation measurement, mathematical models, Welsh-cross pony geldings, big-bale grass silage, grass hay, comparison of chopped to unchopped, fecal excretion curves, equine gut.


Descriptors: bales, carbon dioxide, chemical composition, dry matter, feeds, haylage, herbage, lactic acid bacteria, organic acids, pH, silage, silage additives, silage fermentation, silage making, storage, horses, Phleum pratense.


NAL Call Number: 41.8 SO8
Descriptors: impaction colic, contaminated hay, Datura poisoning, digestive system, toxicology, tef hay contamination.


NAL Call Number: 389.8 B773

Abstract: Four donkeys and four ponies were fed molassed dehydrated alfalfa or oat straw, either ad libitum or restricted to about 70% ad libitum intake in a Latin-square design for four periods of 21 d. Measurements of apparent digestibility and gastrointestinal transit time were made on the last 7 d of each period. When the forages were provided ad libitum, all animals ate significantly (P < 0.01) more of the alfalfa than of the oat straw. Ponies consumed significantly (P = 0.007) more of both diets per unit live weight than donkeys. Higher apparent digestibilities of dietary DM, energy and fibre fractions were seen in donkeys, at both levels of feeding, compared with the ponies. This partly compensated for the lower intakes by the donkeys when fed ad libitum. When intake of alfalfa was restricted, the apparent digestibility of DM was higher compared with the corresponding values when fed ad libitum, but the reverse was true for straw. This may be because restriction of a low-quality diet reduced selection of the more digestible parts of the forage. Donkeys and ponies consumed more energy and protein than required when fed alfalfa ad libitum. Both oat straw treatments provided insufficient protein to meet the predicted requirements of ponies and donkeys. Straw intakes ad libitum exceeded the estimated energy requirement for ponies by 34-51%, but donkey energy requirements were only just met. When the amount of straw offered was restricted, 78-90% of the estimated energy requirement for donkeys was met compared with 90-105% for the ponies.
Descriptors: horse feeding, forage quality, molassed dehydrated alfalfa or oat straw, gastronintestinal transit time, oat straw, alfalfa, feed intake, experimental diets, digestibility, restricted feeding, water intake.


NAL Call Number: SF1.Z6
Descriptors: fescue hay intake, in vivo experimentation, dietary rations, fecal sampling, N-alkanes method, horses.

Language of Text: Italian.

Shingu, Y., S. Kondo, H. Hata, and M. Okubo (2001). Digestibility and number of bites and chews on hay at fixed

**NAL Call Number:** SF277.J37

**Descriptors:** breed variation, nutrition, feed digestibility, feeding behavior comparison, Hokkaido native horses, light half-bred horses, Japan, timothy hay.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, horse diseases, respiratory tract diseases, hay, dust emissions, inflammation, synergism, metalloproteinases, biomarkers, particulates, solubility, chemical composition, bronchi, pulmonary alveoli, polyacrylamide gel electrophoresis, lipopolysaccharides, glucans, molds fungi, etiology, pathogenesis, endotoxins, heaves.
Vitamins and Supplements

NAL Call Number: 49 F84
Descriptors: horses, Shetland ponies, plasma free amino acids, feeding.
Language of Text: French.

Online: http://www.sciencedirect.com/science/journal/03016226
Descriptors: amino acids, carnitine, creatine, performance, racehorses, reviews, horses.

NAL Call Number: DISS F1995101
Descriptors: horses, nutrition, starch content, mixed enzyme supplementation, ae-amylase, xylanase, B-glucanase, pectinase, preileal digestion.
Language of Text: German with an English summary.

NAL Call Number: SF951.E62
Descriptors: horses, beta carotene, supplementary feeding, injection.

NAL Call Number: 389.79 C81
Descriptors: oxidation, stress, retinol, beta carotene, vitamin E, immunity, ascorbic acid, horse feeding, oxidative stress.

Descriptors: horses, serum response, bioavailability indicators, nutrition, effects of feed sources.


NAL Call Number: SF955.E6

Descriptors: horses, respiratory diseases, inflammation, antioxidants, lung function, tests, bronchoalveolar lavage, feed supplements, heaves, oxidative stress.


Descriptors: animal health, chemical composition, digestive system, drug therapy, feed additives, immune system, law, medicinal plants, musculoskeletal system, plant composition, plant extracts, prophylaxis, respiratory system, horses.

Language of Text: German with an English summary.


NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To determine daily variation in urinary clearance and fractional excretion (FE) of electrolytes and minerals within and between horses and to compare volumetric and single-sample urine collection for determining FE values of diets with a range of dietary cation-anion balance (DCAB). ANIMALS: 5 Thoroughbred and 6 mixed-breed mares. PROCEDURE: 3 isocaloric diets with low, medium, and high DCAB values (85, 190, and 380 mEq/kg of dry matter, respectively) were each fed for 14 days. Daily blood samples, single urine samples collected by using a urinary catheter (5 mares), and volumetric urine collections (6 mares) were obtained during the last 72 hours of each diet. RESULTS: Urine and plasma pH values, plasma concentrations, and FE values of sodium, chloride, potassium, magnesium, phosphorus, and calcium were altered by varying the DCAB. Noticeable variation in clearance and FE values was detected within horses from day-to-day on the same diet as well as between horses. Fractional excretion values were not significantly different between single-sample and volumetric methods, except for magnesium in the high DCAB diet. Volumetric and single-sample collections revealed similar patterns of change in urinary FE values with varying DCAB, except for calcium and magnesium. CONCLUSIONS AND CLINICAL RELEVANCE: Substantial variation in clearance and FE of electrolytes and minerals are evident within horses between 24-hour periods as well as between horses fed a specific diet. Three daily urine samples provide similar information regarding dietary-induced changes in clearance and FE values (excluding calcium and magnesium) as that obtained by volumetric urine collection.

Descriptors: urine collection methods, dietary cation-anion balance, excretion of electrolytes, horse nutrition, determination of fractional excretion of electrolytes and minerals.


NAL Call Number: SF955.E6

Descriptors: horses, Echinacea angustifolia, plant extracts, immunostimulants, immunostimulation, efficacy, medicinal properties, immune competence, phagocytosis, lymphocytes, neutrophils, erythrocytes, hemoglobin, hematocrit, erythropoiesis.


Online: 9039326517
NAL Call Number: TRANSL 22766

Abstract: L-carnitine, a betaine derivative of beta-hydroxybutyrate, is found in virtually all cells of higher animals and also in some microorganisms and plants. In animals it is synthesized almost exclusively in the liver. Two essential amino acids, i.e., lysine and methionine serve as primary substrates for its biosynthesis. Also required for its synthesis are sufficient amounts of vitamin B6, nicotinic acids, vitamin C and folate. The first discovered ergogenic function of L-carnitine is the transfer of activated long-chain fatty acids across the inner mitochondrial membrane into the mitochondrial matrix. For this transfer acyl-CoA esters are transesterified to form acylcarnitine esters. Thus, in carnitine deficiency fat oxidation and energy production from fatty acids are markedly impaired. Skeletal muscles constitute the main reservoir of carnitine in the body and have a carnitine concentration at least 200 times higher than blood plasma. Uptake of carnitine by skeletal muscles takes place by an active transport mechanism which transports L-carnitine into muscles probably in the form of an exchange process with gamma-butyrobetain. In young animals including foals, the capacity for biosynthesis of carnitine is not yet fully developed and apparently cannot meet the requirements of sucking animals. Sucking animals depend therefore on an extra supply of carnitine which is usually provided with milk. Additionally, young animals including foals possess a lower concentration of carnitine in blood plasma than adult animals. Besides its role as carrier of activated acyl groups, L-carnitine functions as a buffer for acetyl groups which may be present in excess in different tissues during ketosis and hypoxic muscular activity. Other functions of L-carnitine are protection of membrane structures, stabilizing of a physiologic CoA-SH/acetyl-CoA ratio and reduction of lactate production. Animal's derived feeds are rich in L-carnitine whereas plants contain usually very little or no carnitine. Carnitine is absorbed from the small intestine by active and passive transport mechanisms. From the increase in renal excretion of L-carnitine after oral supplementations of 10 g/d to horses it has been concluded that the efficiency of absorption of L-carnitine is rather low (about 5 to 10% of the supplied dose). A further decrease in fractional carnitine absorption was observed when the oral dose of carnitine was increased. L-carnitine is virtually not degraded in the body and renal excretion of carnitine is comparatively small under normal conditions. The concentration of L-carnitine in blood plasma of horses varies markedly between animals and between different days. In addition, circadian changes in carnitine concentration in plasma have been reported. Peak concentrations were found during late afternoon, being up to 30% higher than those in the morning. In breeding mares the carnitine concentration in blood plasma declines with onset of lactation. In resting skeletal muscles about 90% of the total carnitine content is present as free carnitine with the remaining part being available as carnitine esters. With increasing exercise intensity a continuing greater proportion of free carnitine (up to 80%) is converted into carnitine esters, mainly into acetylcarnitine. This shift from free to acetylcarnitine is readily reversed within about 30 min after termination of exercise. It appears that acute exercise does not have a marked effect on the content of total carnitine in skeletal muscle whereas training seems to elevate its total concentration in the middle gluteal muscle of 3 to 6 year old horses and to reduce variation of its concentration compared to age-matched untrained horses. Oral supplementations of 5 to 50 g of L-carnitine per day to horses elevated the carnitine concentration in blood plasma to about twice its basal concentration. No clear relationship existed, however, between the orally administered dose of carnitine and the increase of L-carni

Descriptors: training of horses, food supply, homeostasis, skeletal muscle, supply balance, potassium, effects of training and food supply.

Notes: Thesis.

Descriptors: training of horses, food supply, homeostasis, skeletal muscle, supply balance, potassium, effects of training and food supply.
Pasture


Abstract: This article presents requirements for management of quality horse pastures.

Descriptors: pastures, grasslands, horse pasture characteristics, fertilizer application, Latvia.

Language of Text: Latvian.


NAL Call Number: SF951.J65

Descriptors: equine foot disease, laminitis, effects of pasture, starch digestion, pasture management practices, grazing management practices, fructans.


Descriptors: horses, barium selenate, erythrocytic glutathione peroxidase activity, selenium status.

Language of Text: Spanish with an English summary.


NAL Call Number: SB199.A94 1996

Descriptors: pastures, Australia, horses feeding and feeds.


NAL Call Number: SF604.V466

Descriptors: horses, sheep, pastures, parasitic contamination, epidemiology.

Language of Text: Portuguese with an English summary.


Descriptors: horses, effect of age differences on infection, nematode infection, epidemiology, intestinal contamination.
Descriptors: horses, pastures, grazing, grasses, quality, palatability, animal feeding, land resources, natural resources, nonrenewable resources, organoleptic properties, quality.
Language of Text: German with English, German and Slovenian summaries.

Descriptors: horses, controlled grazing, grasslands, Bromus inermis, Festuca rubra, Poa pratensis, Bromus, Equidae, feeding systems, Festuca, grazing systems, land cover, mammals, Perissodactyla, Poa, Poaceae, vegetation.
Language of Text: Hungarian with English and Hungarian summaries.

NAL Call Number: SB193.A118
Descriptors: horses, pasture management, pasture yield improvement.
Language of Text: Russian.

Descriptors: autumn, body weight, foaling, growth rate, pastures, racehorses, spring, Thoroughbred, horses.

NAL Call Number: SB617.4.B97 1996
Descriptors: poisonous plants, identification, toxicology, horses health, United States, geographical distribution.

Online: www.jarvm.com
Descriptors: anthelmintics, disease control, disease prevalence, fenbendazole, ivermectin, pastures, potency, stables, horses, Strongylidae.

Descriptors: mares, follicular activity, vernal transition, age, pasture, ovulation.

Abstract: Serologic testing was carried out to show antibodies to Babesia equi and Babesia caballi in mares raised in extensive regime in the "dehesa" of Extremadura, their transmission to the mares' offspring and their permanence in the foals. We have studied 33 Andalusian mare and foal serums. The technique used has been that of indirect immunofluorescence (IFI). The result is 63.6 per cent of the mares and 54.5 per cent of the foals seropositive to B. equi. All serums were negative to B. caballi.
Descriptors: Babesia equi, immunofluorescence, spain, Babesia, Europe, immunological techniques, piroplasmea, protozoa, southern Europe, sporozoa, western Europe.
Language of Text: English and French summaries.
Notes: Meeting Information: Meeting of the Mediterranean Sub Network of the FAO CIHEAM Inter Regional

Descriptors: horses, pasture management, grazing technique, indigenous veterinary practice.


Descriptors: horses, grazing, pasture.


Descriptors: carbohydrates, chemical composition, crude protein, energy content, environmental factors, fiber content, nutritive value, pastures, plant composition, protein content, temperature, Equidae, Festuca arundinacea, Poa pratensis, Trifolium repens.


Descriptors: horses, parasites, helminthoses, parasitology, anthelmintics, pasture.


Descriptors: horses, grazing, pasture management.

Language of Text: Russian.


NAL Call Number: SF311.E9

Descriptors: horses, poisonous plants, poisoning, Sorghum sudanense, Euphorbia esula, Equisetum arvense, Trifolium hybridum, Pteridium aquilinum, Hypericum perforatum, Glechoma hederacea, Prunus serotina, Kalmia latifolia, Solanum dulcamara, Rhododendron maximum, North America.


NAL Call Number:

Descriptors: grazing behavior, grass height and variety, grass intake, feeding preference, selective feeding, preference for shorter grasses, reduction of parasitic infestation, Mulassier Poitevan mares, wet grassland.


NAL Call Number: 41.8 Au72

Descriptors: horses, grazing, nutritional state, pastures, irrigated pastures, feeding preferences, seasonal variation, grazing behavior, horse diseases, nutritive value, literature reviews, Australia, dryland pastures.


**Descriptors:** autumn, bone diseases, foals, metacarpus, metatarsus, postnatal development, racehorses, radiography, seasonal variation, summer, Thoroughbred, horses.


**NAL Call Number:** 23 N4892

**Descriptors:** horses, mares, pregnancy, copper intake, copper deficiency, orthopedic disease, copper supplementation, copper injection.

Giessen Univ. (Germany). Inst. fuer Tierzucht und Haustiergenetik. (1996). *Pferdeweide - Know-how. [Horse pastures - Know-how]. Reiterjournal (Germany)* 17(2): 85-86. ISSN: 0173-2404.

**Descriptors:** pastures, horses, maintenance, fertilizer application, weed control, grazing systems, pasture improvement, feeding systems, grassland management, grazing lands, land resources, natural resources, pest control.

**Language of Text:** German.


**NAL Call Number:** SF285.5.A39 2005

**Descriptors:** pasture productivity, frequently grazed pastures, disease resistant pasture species, pasture production factors, pasture utilization by horses, dry matter intakes (DMI), digestible energy intakes (DEI), Thoroughbreds, growth and development of young horses.


**NAL Call Number:** 41.8 Au72

**Descriptors:** horses, lactating mares, Thoroughbreds, foals, nutrition, pasture feeding, macroelement concentration, microelement concentration, dietary mineral requirements.


**NAL Call Number:** 41.8 N483

**Descriptors:** horses, lactating mares, nutritional value of pasture, digestible energy intake, dry matter digestibility, macroelement absorption.


**Descriptors:** pasture management, stud farms, relationship between pasture management practices and internal parasites, brood mares, foals, nutrition, disease prevention, parasite prevention.

**Abstract:** Laminitis occurs throughout the world in horses and ponies and has major welfare implications. It is obviously important to be able to recognize and treat the condition in its early stages so that pain and suffering are kept to a minimum. However, ideally it would be preferred to be able to recommend certain interventions/countermeasures that avoid or prevent the condition from occurring in the first place. Because pasture-associated laminitis occurs with grass consumption, one obvious way to avoid the condition is to prevent access to pasture and to feed forage alternatives that are known to be low in rapidly fermentable material. For the majority of horses, total restriction is not always a viable or desired option for financial, welfare, and health reasons. It also may not be necessary for those animals that are not predisposed to laminitis. This review discusses the possible countermeasures that could be considered now and in the future in the following 7 key areas: 1) Identifying animals predisposed to the condition; 2) Limiting development of insulin resistance; 3) Avoiding high intakes of rapidly fermentable material; 4) Preventing/reducing the formation and absorption of the various "triggering factors"; 5) Reducing/preventing oxidative damage; 6) Preventing/reducing matrix metalloproteinase activity; and 7) Preventing changes in blood flow. It is unfortunate that little or no hard data exist at present on effective countermeasures, only mechanistic evidence for avoiding risk factors. However, there is much to gain, and research in this area is urgently required.

**Descriptors:** laminitis prevention, genetic predisposition identification, equine nutrition, insulin resistance, fermentation, oxidative damage, metalloproteinase activity, blood flow, risk factors, equine welfare.


**Descriptors:** horse feeding, diet, mineral supplements, nutrient requirements, grazing, feed intake, nutrient content, vitamin supplements, protein supplements, dietary carbohydrate, dietary fat, growth, bones, milk composition, blood sugar, feed supplements, nutrition physiology, product development.


**Descriptors:** feed, nutrition, hydrolyzable carbohydrates, forages, concentrates, nonstructural carbohydrate, hydrolyzable carbohydrate concentration, near-infrared spectrum, seasonal variation, rapidly fermentable carbohydrates, laminitis, colic.


**Abstract:** The feeding value of fresh pasture grazed in situ is determined by animal performance or productivity and could be relatively easily established for growing and lactating horses. Despite this, there is a lack of published information on the relative feeding value of different pastures and forages grazed by horses in New Zealand and the world. In addition, for adult breeding or non-breeding and young or adult sport or performance horses, the definition of feeding value and its determination remain problematic. Limited information suggests that the feeding value of perennial ryegrass-based pasture in New Zealand for young growing horses is high, and growth rates for Thoroughbred horses fed solely on pasture in New Zealand are similar to those reported from the Northern Hemisphere where grain-based supplements are fed in addition to pasture or other forages. Attempts to assess the ability of fresh pastures to meet the nutrient requirements of horses are hampered by problems associated with determination of feed intake by grazing horses and lack of knowledge of the digestibility and utilisation of digested nutrients, including the relative bioavailability of macro- and micro-
minerals in pasture. A further challenge for future research is to determine the effect of herbage allowance and grazing behaviour, including pasture species preferences, on voluntary feed intake by grazing horses. Grazing pasture has benefits for equine health and well-being including reduced risk of some nutrition-related disorders and reduced prevalence of stereotypic behaviour. Pastured horses have greater freedom for expression of natural behaviours including social interaction and exercise. However, grazing pasture is also associated with animal health problems, particularly parasitism and diseases related to pasture-associated toxins.

Descriptors: horses, growth, lactation, feed value, performance, productivity, grazing pasture, forages, parasites.

NAL Call Number: SB193.F59
Descriptors: horses, pastures, pasture plants, forage, grazing.

NAL Call Number: SB202.C6T73
Descriptors: horses, nutrition, forage species, mineral content, Kobresia bellardii, Poa alpigena, Elymus nutans, Festuca ovina, Scirpus distichmatac, Carex scabriostri, Leontopodium nanum, Taraxacum mongolicum.

NAL Call Number: SF604.P82
Descriptors: foals, grazing, nutrition, skeletal growth, weight gain, high-endophyte ryegrass, chicory, Tama ryegrass, Lolium multiflorum cv. Tama, measurement techniques.

NAL Call Number:
Descriptors: grass intake, weight gain, pasture management and production, feeding restriction, pilot studies, access to pasture, ponies.

NAL Call Number: SF1.A66
Descriptors: horses, foals, weight gain, seasonality, feed intake, compensatory growth, concentrate, digestive system, development, pasture.
Language of Text: English with an Polish summary.

NAL Call Number: 60.9 J27
Descriptors: horses, pasture, grazing, feed intake, feed digestibility.
Language of Text: Japanese.

NAL Call Number: 60.9 J27
Abstract: Amount or intake, digestibility and nutritive value of sasa (Sasa nipponica) foliage in Hokkaido native horses were determined on woodland by the double-indicator method and compared among seasons, i.e. summer, non-snowy periods in winter and snowy periods in winter. The total number of mares and fillies used
for experiment were 9 and 3 in summer, 4 and 9 during non-snowy periods in winter and 4 and 6 during snowy periods in winter. The dry matter intake of Sasa nipponica foliage was significantly higher in summer and during non-snowy periods in winter than that during snowy periods in winter (P<0.05). The apparent digestibility of NDF in winter was lower than that in summer (P<0.05). The contents of DCP and DE were 9.2% DM and 1.73 Mcal/kgDM in winter, and were similar to those in summer. The DCP intake of mares and fillies were more than the maintenance requirements (NRC, 1989) of the horses in all seasons. The DE intake of mares was found to be less than the maintenance requirement of the horses during snowy periods in winter, resulting into their body weight losses during this experimental periods. The DE intake of fillies were more than maintenance requirement in all seasons, while their body weight increased in summer and during non-snowy periods in winter, and maintained during snowy periods in winter.

Descriptors: Sasa nipponica, nutritive value of sasa, Hokkaido native horses, Japan, seasonal comparision, body weights, feeding habits of horses.

Language of Text: English and Japanese summaries.


Descriptors: grazing behavior, digestive system, forage intake, passage rate.


Descriptors: horses, energy requirement, pasture intake.


Descriptors: laminitis prevention, predisposition identification, pedigree analysis, equine nutrition.


Abstract: Objective-To describe spontaneous locomotion activity of foals kept under various management conditions and assess the suitability of global positioning system (GPS) technology for recording foal activity. Animals-59 foals. Procedures-During the foals' first 4 months of life, 921 observation periods (15 minutes each) were collected and analyzed for locomotion activities. The GPS system was evaluated by simultaneously carrying out field observations with a handheld computer. Results-Foals spent 0.5% of total observed time cantering, 0.2% trotting, 10.7% walking, 32.0% grazing, 34.8% standing, and 21.6% lying down. Total observed daytime workload (velocity x distance) in the first month was approximately twice that in the following months. Locomotion activity decreased with increasing age. Colts had more activity than fillies in certain periods, and foals that were stabled for some portion of the day had compensatory locomotion activity, which was probably insufficient to reach the level of foals kept continually outside. The GPS recordings and handheld-computer observations were strongly correlated for canter, trot, and walk and moderately correlated for standing and lying. Correlation for grazing was low. Conclusions and Clinical Relevance-Results indicated that domestically managed foals, when kept 24 h/d at pasture, will exercise at a level comparable with feral foals. High workload during the first month of life might be important for conditioning the musculoskeletal system. The GPS technique accurately quantified canter, trot, and walk activities; less accurately indexed resting; and was unsuitable for grazing because of the wide array of velocities used while foraging.

Descriptors: foals, management practices, global positioning system, activity recording methods, daytime workload.

Abstract: Fresh forages constitute a majority of the diet for many horses and ponies that graze on pastures during the growing season in many parts of the world. Grasses generally predominate in such pastures, with varying proportions of legumes. Nonstructural carbohydrates (NSC) (simple sugars, starch, and fructan) can induce laminitis experimentally, and NSC can accumulate to >400 g/kg of dry matter (DM) in pasture grasses. In this article we discuss the environmental factors affecting NSC accumulation in pastures and estimate the potential daily intakes of pasture NSC by grazing horses. We also discuss strategies for both reducing the NSC content of pastures and management practices that can help reduce intakes of pasture NSC by equines at risk of developing laminitis. This study reveals the importance of accurate forage analysis in the development of feeding regimens for equines at risk of laminitis.

Descriptors: diet composition, grasses, dry matter, forage analysis, nonstructural carbohydrates, administration of dietary carbohydrates, dosage of dietary carbohydrates, laminitis.
limited or no access to green herbage as an important risk factor for EMND. HYPOTHESIS: Grazing horses that have an apparently adequate intake of pasture herbage to meet normal equine vitamin E requirements can develop EMND. METHODS: Owners of 32 European horses diagnosed with EMND completed a questionnaire regarding intrinsic, managemental, nutritional and environmental factors that could potentially be risk factors for EMND, and also regarding clinical signs, treatments and case outcome. Plasma/serum vitamin E data for these horses were supplied by the veterinarians. No control population was studied. RESULTS: Thirteen of 32 horses (termed the 'grazing' group) had part- or full-time access to grass-based pasture at the onset of EMND (median duration at pasture 12 h/day, range 3-24 h). Five of these horses were at pasture for at least 235 h/day at the onset of EMND, 2 of which were at pasture for at least 23.5 h/day throughout the year. Despite grazing, all these horses had a low vitamin E status. The remaining 19 horses resembled those cases reported from North America, in that they had no or limited access to pasture. CONCLUSIONS AND POTENTIAL RELEVANCE: A diagnosis of EMND should not be discounted on the basis that a horse has access, even full-time, to lush grass-based pasture. Inadequate vitamin E intake was probably not the sole cause of either the EMND or the low vitamin E status in the grazing horses; the latter was probably the result of abnormal bioavailability or excessive utilisation of vitamin E.

Descriptors: equine motor neuron disease, pasture effects, risk factors, vitamin E requirements, pasture access.

NAL Call Number: SF951.J65
Descriptors: horses, pasture, grazing, behavior, Strongylus vulgaris, parasite predisposition.

NAL Call Number: 41.8 C163
Descriptors: horses, cold zones, cold stress, winter hardiness, animal behavior, air temperature, snow, rain, wind, body condition, thyroid hormones, blood serum, hairs, animal housing, horse breeds, Norway, shivering, Icelandic pony horse breed.
Language of Text: English with a French summary.

NAL Call Number: SB193.F59
Descriptors: horses, pasture plants, poisonous plants, poisoning.

NAL Call Number: 49 F84
Descriptors: horses, age variation, nutrition, pasture intake, grazing preference, Medicago sativa, Dactylis glomerata, Lolium perenne, Trifolium repens, Taraxacum officinale, Poa pratensis.

Descriptors: horses, grazing, feeding systems, pasture management, adequate nutrition, pasture diversity, surveys.

Descriptors: natural pastures, rangelands, highlands, stocking density, grazing intensity, mixed grazing, cattle, horses, feeding habits, Auvergne, behavior, Bovidae, Bovinae, domestic animals, Europe, feeding systems, France, grassland management, grazing systems, land resources, livestock, livestock management, natural resources, nonrenewable resources, pasture, physiographic features, ruminants, useful animals, western Europe.


NAL Call Number: 23 N4892

Descriptors: horses, nutrition, pasture content, mineral levels.


NAL Call Number: 18 W96

Descriptors: mares, foals, animal housing, design, free range husbandry, animal welfare, loose housing system, young horse needs, pastures, farming systems, grazing lands.

Language of Text: German.


NAL Call Number: 49.9 N483

Descriptors: horses, nutrition, pasture, grazing, fecal pH, grain supplementation.


Descriptors: pasture management, pest control, fly prevalence, effect of climate on fly population.

Language of Text: Polish.


NAL Call Number: QL876.B5

Descriptors: horses, pregnant mares, reproduction, pastures, endophytes, tall Fescue plants, toxicology.


Descriptors: antibodies, artificial insemination, clinical aspects, copulation, disease prevalence, disease prevention, epidemics, epidemiology, exanthema, genes, mares, stallions, viral proteins, virus neutralization, equine herpesvirus, horses.


**Descriptors:** horses, pasture management, maintenance procedures.


**Descriptors:** horse pastures, cooperative extension services, surveys.


**Descriptors:** horses, pasture, effects of frost on pasture, fungi, bacteria, reproductive loss syndrome.


**Descriptors:** foals, *Strongylus vulgaris*, grazing, nematode infections, incidence, nematode larvae, mixed infections, cyathostoma, contamination, vigor, weight gain, feces, anorexia, postmortem examinations, blood chemistry, prepatent period, albumins, globulins.


**Descriptors:** pasture management methods, parasite infestation, anthelminthic program, *Strongylus*.

**Language of Text:** Thai with an English summary.


**Abstract:** OBJECTIVE: To evaluate genetic and metabolic predispositions and nutritional risk factors for development of pasture-associated laminitis in ponies. DESIGN: Observational cohort study. ANIMALS: 160 ponies. PROCEDURES: A previous diagnosis of laminitis was used to differentiate 54 ponies (PL group) from 106 nonlaminitic ponies (NL group). Pedigree analysis was used to determine a mode of inheritance for ponies with a previous diagnosis of laminitis. In early March, ponies were weighed and scored for body condition and basal venous blood samples were obtained. Plasma was analyzed for glucose, insulin, triglycerides, nonesterified fatty acids, and cortisol concentrations. Basal proxies for insulin sensitivity (reciprocal of the
square root of insulin [RISQI]) and insulin secretory response (modified insulin-to-glucose ratio [MIRG]) were calculated. Observations were repeated in May, when some ponies had signs of clinical laminitis. RESULTS: A previous diagnosis of laminitis was consistent with the expected inheritance of a dominant major gene or genes with reduced penetrance. A prelaminitic metabolic profile was defined on the basis of body condition, plasma triglyceride concentration, RISQI, and MIRG. Meeting ≥ 3 of these criteria differentiated PL- from NL-group ponies with a total predictive power of 78%. Determination of prelaminitic metabolic syndrome in March predicted 11 of 13 cases of clinical laminitis observed in May when pasture starch concentration was high.

CONCLUSIONS AND CLINICAL RELEVANCE: Prelaminitic metabolic syndrome in apparently healthy ponies is comparable to metabolic syndromes in humans and is the first such set of risk factors to be supported by data in equids. Prelaminitic metabolic syndrome identifies ponies requiring special management, such as avoiding high starch intake that exacerbates insulin resistance.

Descriptors: equine laminitis, metabolic and genetic predisposition, nutritional risk factors, pedigree analysis, body condition scoring, basal venous blood values, insulin sensitivity, management practices.


Descriptors: horses, pasture, grazing, forage intake, weight gain, mixed pasture grasses, Festuca, Dactylis, growth and lignin content of grass.


Descriptors: application rates, botanical composition, calcium, chemical composition, crude protein, grass sward, magnesium, nutrient content, nutritive value, phosphorus, plant composition, potassium, protein content, woodland grasslands, Festuca rubra, horses, Lolium perenne, Phleum pratense, Poa pratensis, Trifolium repens.


Online: http://learningstore.uwex.edu/pdf/A3680.pdf

Descriptors: pastures.


NAL Call Number: aSF757.5.E53 1999

Descriptors: veterinary toxicology, horse diseases and pests, United States, endophytic fungi, endophytes, pastures, mycotoxins.


ISSN: 0065-7182.

NAL Call Number: SF601.A46

Descriptors: foals, growth rate, Argentina, biological development, growth of horses, pasture feeding.


NAL Call Number: SF951.C56

Descriptors: horses, laminitis, hydrolyzable carbohydrates, fructan, metabolic disorders, forage content, management practices, feeding.

Notes: Special issue: Laminitis.

**NAL Call Number:** 41.8 N483

**Descriptors:** horses, pasture, supplementation, nutrition, supplement injection, barium, selenium, trace elements.

in all seasons, while their body weight increased in summer and during non-snowy periods in winter, and maintained during snowy periods in winter.

**Descriptors:** *Sasa nipponica*, nutritive value of sasa, Hokkaido native horses, Japan, seasonal comparison, body weights, feeding habits of horses.

**Language of Text:** English and Japanese summaries.


**NAL Call Number:** SB617.4.B97 1996

**Descriptors:** poisonous plants, identification, toxicology, horses health, United States, geographical distribution.

Giessen Univ. (Germany). Inst. fuer Tierzucht und Haustiergenetik. (1996). *Pferdeweide - Know-how. [Horse pastures - Know-how]*. Reiterjournal (Germany) 17(2): 85-86. ISSN: 0173-2404.

**Descriptors:** pastures, horses, maintenance, fertilizer application, weed control, grazing systems, pasture improvement, feeding systems, grassland management, grazing lands, land resources, natural resources, pest control.

**Language of Text:** German.


**Abstract:** This article presents requirements for management of quality horse pastures.

**Descriptors:** pastures, grasslands, horse pasture characteristics, fertilizer application, Latvia.

**Language of Text:** Latvian.


**NAL Call Number:** SB199.A94 1996

**Descriptors:** pastures, Australia, horses feeding and feeds.


**Descriptors:** pastures.


**NAL Call Number:** SF285.5.A39 2005

**Descriptors:** pasture productivity, frequently grazed pastures, disease resistant pasture species, pasture production factors, pasture utilization by horses, dry matter intakes (DMI), digestible energy intakes (DEI), Thoroughbreds, growth and development of young horses.


**Descriptors:** pasture management, stud farms, relationship between pasture management practices and internal
parasites, brood mares, foals, nutrition, disease prevention, parasite prevention.


Descriptors: natural pastures, rangelands, highlands, stocking density, grazing intensity, mixed grazing, cattle, horses, feeding habits, Auvergne, behavior, Bovidae, Bovinae, domestic animals, Europe, feeding systems, France, grassland management, grazing systems, land resources, livestock, livestock management, natural resources, nonrenewable resources, pasture, physiographic features, ruminants, useful animals, western Europe.


Descriptors: mares, follicular activity, vernal transition, age, pasture, ovulation.


NAL Call Number: 18 W96

Descriptors: mares, foals, animal housing, design, free range husbandry, animal welfare, loose housing system, young horse needs, pastures, farming systems, grazing lands.

Language of Text: German.


NAL Call Number: 41.8 R32

Descriptors: mares, draft horses, grazing, pastures, biological contamination, Strongyles, *Strongylus vulgaris*, parasitic infection.


Descriptors: horses, tall fescue grass, grazing, pasture, *Neotyphodium coenophialum*, toxins, endophytes, literature reviews, surveys.


NAL Call Number: 41.8 V641

Descriptors: horses, summer, animal diseases, grazing, seasons, drug therapy, respiratory disorders, endoscopy, inflammation, granulocytes, clenbuterol, prednisolone, respiratory diseases, hypersensitivity, adrenal cortex hormones, agricultural chemicals, animal feeding, behavior, blood, blood cells, cells, corticoids, disease control, disorders, feeding habits, functional disorders, glucocorticoids, hormones, immunological diseases, leukocytes, organic diseases, seasons, therapy, dyspnoea, neutrophils, obstructive pulmonary disease.


NAL Call Number: QL876.B5
Descriptors: horses, pregnant mares, reproduction, pastures, endophytes, tall Fescue plants, toxicology.


NAL Call Number: SF311.E9

Descriptors: horses, poisonous plants, poisoning, Sorghum sudanense, Euphorbia esula, Equisetum arvense, Trifolium hybridum, Pteridium aquilinum, Hypericum perforatum, Glechoma hederacea, Prunus serotina, Kalmia latifolia, Solanum dulcamara, Rhododendron maximum, North America.

NAL Call Number: SB193.F59
Descriptors: horses, pastures, pasture plants, forage, grazing.

Descriptors: horses, pastures, grazing, grasses, quality, palatability, animal feeding, land resources, natural resources, nonrenewable resources, organoleptic properties, quality.
Language of Text: German with English, German and Slovenian summaries.

NAL Call Number: 41.8 N483
Descriptors: horses, pasture, supplementation, nutrition, supplement injection, barium, selenium, trace elements.

NAL Call Number: SB193.F59
Descriptors: horses, pasture plants, poisonous plants, poisoning.

NAL Call Number: SB193.A1L8
Descriptors: horses, pasture management, pasture yield improvement.
Language of Text: Russian.

NAL Call Number: SF951.J65
Descriptors: horses, pasture management, maintenance procedures, forage species, stocking rates, fertilization, nutrition.

NAL Call Number: SF951.J65
Descriptors: horses, pasture management, maintenance procedures.

Descriptors: horses, pasture management, grazing technique, indigenous veterinary practice.

Descriptors: horses, pasture, grazing, forage intake, weight gain, mixed pasture grasses, *Festuca, Dactylis*, growth and lignin content of grass.

NAL Call Number: 60.9 J27
Descriptors: horses, pasture, grazing, feed intake, feed digestibility.
Language of Text: Japanese.

NAL Call Number: 49 J82
Descriptors: horses, nutrition, selenium, copper, oat, vetch pasture grazing.
Notes: Meeting Information: 88th Annual Meeting of the American Society of Animal Science, Rapid City, South Dakota, USA; July 24-26, 1996.
NAL Call Number: SB202.C6T73
Descriptors: horses, nutrition, forage species, mineral content, Kobresia bellardii, Poa alpigena, Elymus nutans, Festuca ovina, Scirpus distigmaticus, Carex scabriostris, Leontopodium nanum, Taraxacum mongolicum.

NAL Call Number: 23 N4892
Descriptors: horses, mares, pregnancy, copper intake, copper deficiency, orthopedic disease, copper supplementation, copper injection.

NAL Call Number: SF951.C56
Descriptors: horses, laminitis, hydrolyzable carbohydrates, fructan, metabolic disorders, forage content, management practices, feeding.
Notes: Special issue: Laminitis.

NAL Call Number: 41.8 Au72
Descriptors: horses, lactating mares, Thoroughbreds, foals, nutrition, pasture feeding, macroelement concentration, microelement concentration, dietary mineral requirements.

NAL Call Number: 41.8 N483
Descriptors: horses, lactating mares, nutritional value of pasture, digestible energy intake, dry matter digestibility, macroelement absorption.

NAL Call Number: 41.8 N483
Abstract: The feeding value of fresh pasture grazed in situ is determined by animal performance or productivity and could be relatively easily established for growing and lactating horses. Despite this, there is a lack of published information on the relative feeding value of different pastures and forages grazed by horses in New Zealand and the world. In addition, for adult breeding or non-breeding and young or adult sport or performance horses, the definition of feeding value and its determination remain problematic. Limited information suggests that the feeding value of perennial ryegrass-based pasture in New Zealand for young growing horses is high, and growth rates for Thoroughbred horses fed solely on pasture in New Zealand are similar to those reported from the Northern Hemisphere where grain-based supplements are fed in addition to pasture or other forages. Attempts to assess the ability of fresh pastures to meet the nutrient requirements of horses are hampered by problems associated with determination of feed intake by grazing horses and lack of knowledge of the digestibility and utilisation of digested nutrients, including the relative bioavailability of macro- and micro-minerals in pasture. A further challenge for future research is to determine the effect of herbage allowance and grazing behaviour, including pasture species preferences, on voluntary feed intake by grazing horses. Grazing
pasture has benefits for equine health and well-being including reduced risk of some nutrition-related disorders and reduced prevalence of stereotypic behaviour. Pastured horses have greater freedom for expression of natural behaviours including social interaction and exercise. However, grazing pasture is also associated with animal health problems, particularly parasitism and diseases related to pasture-associated toxins.

Descriptors: horses, growth, lactation, feed value, performance, productivity, grazing pasture, forages, parasites.


Descriptors: horses, grazing, pasture management.
Language of Text: Russian.


Descriptors: horses, grazing, pasture.


NAL Call Number: 41.8 Au72
Descriptors: horses, grazing, nutritional state, pastures, irrigated pastures, feeding preferences, seasonal variation, grazing behavior, horse diseases, nutritive value, literature reviews, Australia, dryland pastures.


Descriptors: horses, grazing, feeding systems, pasture management, adequate nutrition, pasture diversity, surveys.


NAL Call Number: SF1.A66
Descriptors: horses, foals, weight gain, seasonality, feed intake, compensatory growth, concentrate, digestive system, development, pasture.
Language of Text: English with a Polish summary.


Descriptors: horses, epidemiological studies, parasitology, pasture contamination.


Descriptors: horses, energy requirement, pasture intake.


Descriptors: horses, effect of age differences on infection, nematode infection, epidemiology, intestinal contamination.
Language of Text: English with a Portuguese summary.

Descriptors: horses, controlled grazing, grasslands, Bromus inermis, Festuca rubra, Poa pratensis, Bromus, Equidae, feeding systems, Festuca, grazing systems, land cover, mammals, Perissodactyla, Poa, Poaceae, vegetation.

Language of Text: Hungarian with English and Hungarian summaries.


NAL Call Number: 49 F84

Descriptors: horses, age variation, nutrition, pasture intake, grazing preference, Medicago sativa, Dactylis glomerata, Lolium perenne, Trifolium repens, Taraxacum officinale, Poa pratensis.


NAL Call Number: S530.J6

Descriptors: horse pastures, cooperative extension services, surveys.


NAL Call Number: 389.79 C81

Descriptors: horse feeding, diet, mineral supplements, nutrient requirements, grazing, feed intake, nutrient content, vitamin supplements, protein supplements, dietary carbohydrate, dietary fat, growth, bones, milk composition, blood sugar, feed supplements, nutrition physiology, product development.


Descriptors: grazing behavior, seasonal variation, effect of snowfall, feed intake, feed digestibility.


NAL Call Number:

Descriptors: grazing behavior, grass height and variety, grass intake, feeding preference, selective feeding, preference for shorter grasses, reduction of parasitic infestation, Mulassier Poitevan mares, wet grassland.


Descriptors: grazing behavior, digestive system, forage intake, passage rate.

**NAL Call Number:**

**Descriptors:** grass intake, weight gain, pasture management and production, feeding restriction, pilot studies, access to pasture, ponies.


**NAL Call Number:** SF601.A46

**Descriptors:** foals, growth rate, Argentina, biological development, growth of horses, pasture feeding.


**NAL Call Number:** SF604.P82

**Descriptors:** foals, grazing, nutrition, skeletal growth, weight gain, high-endophyte ryegrass, chicory, Tama ryegrass, Lolium multiflorum cv. Tama, measurement techniques.


**NAL Call Number:** 49 J82

**Descriptors:** feed, nutrition, hydrolyzable carbohydrates, forages, concentrates, nonstructural carbohydrate, hydrolyzable carbohydrate concentration, near-infrared spectrum, seasonal variation, rapidly fermentable carbohydrates, laminitis, colic.


**NAL Call Number:** SF951.J65

**Descriptors:** equine foot disease, laminitis, effects of pasture, starch digestion, pasture management practices, grazing management practices, fructans.


**Abstract:** Serologic testing was carried out to show antibodies to Babesia equi and Babesia caballi in mares raised in extensive regime in the "dehesa" of Extremadura, their transmission to the mares' offspring and their permanence in the foals. We have studied 33 Andalusian mare and foal serums. The technique used has been that of indirect immunofluorescence (IFI). The result is 63.6 per cent of the mares and 54.5 per cent of the foals seropositive to B. equi. All serums were negative to B. caballi.

**Descriptors:** Babesia equi, immunofluorescence, spain, Babesia, Europe, immunological techniques, piroplasmea, protozoa, southern Europe, sporozoa, western Europe.

**Language of Text:** English and French summaries.

**Notes:** Meeting Information: Meeting of the Mediterranean Sub Network of the FAO CIHEAM Inter Regional Cooperative Research and Development Network on Pastures and Fodder Crops. Badajoz (Spain). 26-29 Nov 1997.

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**Pasture -- Web Resources**
Horse Nutrition, Bulletin 762-00, Pasture Management.
   Online: http://ohioline.osu.edu/b762/b762_19.html
   Description: Pasture improvement strategies including weed control, maximizing soil fertility, rotation of grazing land, and regular renovation.

Horse Pasture Management.
   Online: http://www.rce.rutgers.edu/horsepastures/
   Description: Pasture management strategies to enhance welfare of horses and efficiency of land maintenance. Includes information on pasture species, toxic plants, soil fertility, and weed control.

Manure and Pasture Management for Recreational Horse Owners.
   Online: http://www.extension.umn.edu/distribution/naturalresources/components/7540_05.html
   Description: Strategies for efficient use of pasture. Includes a calendar that summarizes pasture management practices for March through October.

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Last updated: October 25, 2011
PMU Ranching


Descriptors: estrogen extraction methods, pregnant mare urine, solid phase extraction, PMU.


Descriptors: estrogen extraction methods, hormone replacement therapy, pregnant mare urine, solid-phase extraction, semi-polar adsorber resin.


Descriptors: animal welfare, drug industry, estrogens, pregnant mares urine, PMU ranching, Canada.


Descriptors: animal rights, drug industry, estrogens, horses, professional ethics, pregnant mares urine, horse welfare.

Notes: Comment On: Canadian Medical Association Journal. 1994 Oct 1;151(7):1009-1012.


Descriptors: animal rights, drug industry, estrogens, pregnant mares urine, Canada, ethics.

Notes: Comment On: Canadian Medical Association Journal. 1994 Oct 1;151(7):1009-1012.


Abstract: Many clinicians are experiencing consumer resistance to the prescription of equine HRT (that is hormone replacement therapy which has been manufactured from mare's urine). In this paper I consider the ethical implications of prescribing these preparations. I decide that patients should have a right to refuse such treatment but also ask whether a prescribing doctor should choose one preparation over another on moral grounds. I determine that there is prima facie evidence to suggest that mares may suffer and that prescription of equine HRT (instead of synthetic oestrogen-oestriol) would therefore have to be justified in terms of either offering greater benefits to the women or offering greater value for money to the health service. I find that there is no substantial evidence to suggest that equine HRT offers unique advantages over and above oestriol. I
conclude that it would be preferable for a doctor to recommend the synthetic oestrogen to women who want relief from the symptoms of the menopause and protection from osteoporosis and cardiovascular disease. **Descriptors:** animal rights activism, estriol, estrogen replacement therapy, medical ethics, moral obligations, urine chemistry, bone density, horses, menopause drug effects, suffering of mares, synthetic estrogen.


NAL Call Number: 41.8 Am3

Descriptors: animal welfare, horses, pregnant mares urine, animal rights, drug industry, estrogens, animal housing, horse welfare.


NAL Call Number: 41.8 Am3

Descriptors: animal welfare, estrogens in urine, horses, equine housing, pregnant mares urine, PMU ranching.


NAL Call Number: QL750.A6

Descriptors: pregnant mare urine (PMU), comparison of behaviors between draft and light pregnant mares, recording of behavioral activities, stereotypic behavior, time budgets, low prevalence of stereotypic behavior of mares in tie-stalls, management systems.


NAL Call Number: 41.8 Am3

Descriptors: animal husbandry, animal welfare, equine housing, pregnant mares urine, PMU ranching.


NAL Call Number: 41.8 Am3

Descriptors: mares, pregnancy, urine, biological production, animal welfare, animal husbandry.


NAL Call Number: SF601.A46

Descriptors: urine, animal welfare, water intake, pregnant mare urine.


Online: http://www.uspto.gov/patft/index.html

Descriptors: horse urine collection device with detachable head part, pregnant mares urine, collection of urine, holding harness, horse welfare and comfort, allows possibility of grazing.


Online: http://www.uspto.gov/patft/index.html

Descriptors: holding harness, urine collecting device, patent, comfort of wear for horse, freedom of movement, allows possibility to graze instead of tethered in narrow stall.

**NAL Call Number:** HV4701.A557  
**Descriptors:** horses, mares, pregnancy, animal welfare, housing, straight stalls, exercise limitation, behavior, plasma cortisol levels, cortisol response to ACTH, rebound locomotion.

**NAL Call Number:** QL750.A6  
**Descriptors:** horse welfare, pregnant mare urine (PMU), collection device, housing, welfare.

**NAL Call Number:** 49 J82  
**Descriptors:** horses, mares, pregnancy, reproduction, endocrine system, effects of housing, hydration, animal welfare.  

**Online:** http://www.ag.ndsu.nodak.edu/ndagres/fall97/ar21197a.htm  
**Descriptors:** mares, pregnancy, estradiol, hydrocortisone, hormone secretion, urine, water intake, stalls, exercise, confinement in tie-stalls, restricted water intake.

**NAL Call Number:** aHV4701.A952  
**Descriptors:** pregnant mares urine, PMU, mare, animal welfare, inspection, collection, crossbreeding, foals.

**Descriptors:** economic and social impacts of the horse industry, North America, horse racing, hippotherapy, PMU ranching, estrogen replacement hormones, equine import and export, horses as livestock, animal welfare.

**NAL Call Number:** SF601.A46  
**Descriptors:** urine, animal behavior, water intake, animal welfare, pregnant mare urine.

**Descriptors:** animal rights activism, PMU ranching, horse welfare, mares, production of Premarin.  
**Notes:** Meeting Information: 27th Annual Meeting of the American Society for Bone and Mineral Research, Nashville, TN, USA; September 23-27, 2005.

**Descriptors:** animal rights, horses urine, animal husbandry, Premarin production, PMU ranching, horse welfare.  

**Abstract:** An apparatus for collection of free-flow urine from female horses is described. This apparatus is a modification of a similar device described previously. It allows the collection of voided urine from adult female horses without confining them to metabolic stables or resorting to invasive procedures like bladder catheterization. It is relatively easy to use after a short adaptation period.

**Descriptors:** urine, equipment design, free flow urine collection, pregnant mares, horse welfare, alternative to metabolic stalls or bladder catheterization.

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Safety

NAL Call Number: 41.8 D482
Descriptors: horses, effects of genetics and management on health risks, infectious disease prevention.
Language of Text: German.

NAL Call Number: 41.8 D482
Descriptors: horses, animal husbandry, animal housing, fractures, head, accident prevention, body parts, body regions, lesions, safety.
Language of Text: German.

Online: http://www.uspto.gov/patft/index.html
Descriptors: horses, transportation, restraint, safety harness.

NAL Call Number: 58.8 L235
Descriptors: horses, animal welfare, German animal protection law, housing systems.
Language of Text: German with an English summary.

Descriptors: temperature, stress, transport, animal welfare, land transportation, farm animals.

NAL Call Number: SF951.E68 2001
Descriptors: horses, anatomy, nutrition, physiology, reproduction, genetics, anesthesia, first aid, equine management.

**Descriptors:** horses, emergency, first aid, insurance, fire, accident prevention, transport safety.


**NAL Call Number:** 41.8 Am3

**Descriptors:** tranquilizers, anesthesia, lidocaine, detomidine hydrochloride, acepromazine maleate, yohimbine, zolazepam, guaifenesin, atropine, tiletamine hydrochloride, ketamine hydrochloride, xylazine.


**NAL Call Number:** 41.8 Am3

**Descriptors:** legislation, law, animal welfare, gaited horses, Horse Protection Act, United States.

**Notes:** Meeting Information: Presented at the 1999 AVMA Animal Welfare Forum.


**Descriptors:** large animals, animal welfare, safety, behavior, handling, training.

**Notes:** Special issue: *Animal Handlers*.


**NAL Call Number:** SF951.H382 2002

**Descriptors:** horse diseases, horse care, emergencies, veterinary care, equine veterinarians, veterinary handbook.


**Descriptors:** horses, wounds, veterinary medicine, first aid, health protection, lesions, safety, treatment, diseases, emergency care.


**NAL Call Number:** SF285.H86 2004

**Descriptors:** horses, buying and selling, leasing a horse, health and nutrition, feeds and supplements, techniques for breaking in young horses, management practices, animal welfare, first aid, nutrition, facility management, transportation, training, dealing with difficult horses, diseases, parasites, handling, riding, employment in the horse industry, Australia, New Zealand.


**NAL Call Number:** SF951.J65

**Descriptors:** horse sports, animal husbandry, safety around horses, behavior, recreation, horseback riding.


**Descriptors:** horses, handling safety, hazards.


**Descriptors:** animal behavior, equipment, horse riding, riding animals, safety, training of animals, transport of animals, horses.

**NAL Call Number:** 44.8 J822  
**Descriptors:** animal handling, safety, helmets.  
**Notes:** Meeting Information: Joint Annual Meeting of the American Dairy Science Association, the American Society of Animal Science and the Mexican Association of Animal Production, Phoenix, Arizona, USA; June 22-26, 2003.


**NAL Call Number:** SF951.O77 2003  
**Descriptors:** veterinary manual, emergency care of horses, surgical procedures, disaster management, drug information and administration, bleeding disorders, veterinary procedures, interpretation methods, nutritional guidelines, anesthesia, euthanasia, CPR, vaccination schedules, horse breed registry information.


**NAL Call Number:** SF955.E6  
**Descriptors:** horses, competition, three day eventing, accidents, risk factors, cross-country course safety.


**NAL Call Number:** SF951.J65  
**Descriptors:** horses, housing, fire safety, fire prevention.


**NAL Call Number:** 41.8 T445  
**Descriptors:** horses, dromedaries, falcons, racehorses, management in extreme climates, veterinary research, vaccines, animal health.  
**Language of Text:** German with an English summary.

### Safety -- Web Resources

**Disaster Guidelines.**  
**Online:** [http://www.marylandhorseindustry.org/disaster.htm](http://www.marylandhorseindustry.org/disaster.htm)  
**Description:** Plan of action for before, during, and after a natural disaster.

**Disaster Preparedness - American Veterinary Medical Association (AVMA).**  
**Online:** [http://www.avma.org/disaster/default.asp](http://www.avma.org/disaster/default.asp)  
**Description:** Link to purchase the AVMA Disaster Preparedness and Response Guide, published by the American Veterinary Medical Association which is geared toward individuals in the veterinary or emergency management fields as well as anyone interested in disaster planning for animals.

**Emergency and Disaster Preparedness. American Association of Equine Practioners.**  
**Online:** [http://www.aaeep.org/emergency_prep.htm](http://www.aaeep.org/emergency_prep.htm)  
**Description:** Provides resources for equine practitioners and horse owners, including guidelines and hurricane equine evacuation.
Fire Safety for Horse Owners.
   **Online:** http://www.plumasfiresafe.org/equine.htm
   **Description:** Tips on how to minimize fire hazards, create an emergency kit, and develop an evacuation plan. Information geared toward wildfires.

Fire Safety in Horse Stables. Zajaczkowski, J.S. and E. Wheeler.
   **Online:** http://www.abe.psu.edu/extension/factsheets/g/G100.pdf
   **Description:** Extensive fire prevention and preparation information including barn construction, storage, and general management methods to minimize hazardous potential. Details on hay fires and fire extinguisher types and uses.

Animal Management in Disasters.
   **Online:** http://www.animaldisasters.com/
   **Description:** Geared toward animal caretakers and professionals in emergency management. Provides information, planning guidelines, references, and research tools.

Guidelines for Horses During Disasters: Information for Veterinarians. Heath, S.E.
   **Online:** http://www.avma.org/disaster/responseguide/F_horses.pdf
   **Description:** Geared toward veterinarians. Contains methods of animal identification, restraint, and confinement. Addresses specific health and sanitation concerns and includes a chart with specific drug doses depending on animal weight.

   **Online:** http://nasdonline.org/static_content/documents/1048/d000843.pdf
   **Description:** Fire safety with regard to barn construction, electrical systems, and lighting protection. Also lists common farm fire hazards.
Training


Descriptors: horses, Andalusian horses, training response, physiological effects of training.


Abstract: Beta-endorphin and ACTH response was examined after SET (Standardized Exercise Test) on horses during a training protocol of two months. A significant increase after SET on hormonal levels was detected. Basal values and hormonal response to exercise significantly decreased during training period.

Descriptors: treadmill exercise tests, corticotropin, physical activity, endorphins, physiological regulation, effect of training on hormone levels.

Language of Text: Italian.


NAL Call Number: SF277.J37

Descriptors: horses, effects of training on enzyme activity.


Descriptors: horses, training for public service, police horses, military horses.


Descriptors: horses, training, selenium, vitamin E, free radical savengers.


NAL Call Number: SF601.V38

Descriptors: horses, effects of training on biochemical defense.


**Descriptors**: horses, lateral heel wedges, shoeing, Shetland ponies, training, feeding.


**Descriptors**: horses, computerised tomography, effects of training, racehorses, bone density.


**Descriptors**: horses, foals, effects of training, bone characteristics.


**Descriptors**: horses, calcium, phosphorus, supplementary feeding, mineral metabolism, nutrient balance, physical activity, training of animals, age differences, digestibility, time, urine, feces, blood serum.


**Descriptors**: horses, racehorses, training, performance, cardiovascular response, echocardiography.


**Descriptors**: horses, training, arterial hypoxemia.


**Descriptors**: racing, Thoroughbreds, musculoskeletal injury.


**Descriptors**: horses, lateral heel wedges, shoeing, Shetland ponies, training, feeding.

Descriptors: horses, cytokine production stimulated by physical exertion, mRNA, leukocytes, training, leukocyte cytokine responses, training program, Thoroughbreds.


Descriptors: horses, training, eventing, physiological effects, cardiac effects.


Abstract: RR intervals of ten elite trotting horses were recorded during an interval training session performed on track. This study examined two hypotheses. Firstly, like in humans, the hyperpnea combined with a decrease in cardiac autonomic control on heart rate during heavy exercise could result in a prevalence of high frequency heart rate variability. Secondly, this prevalence could increase with the heavy exercise repetition. Two exercise intensities were compared: moderate (ME) and heavy (HE). Furthermore, heavy exercise repetitions were compared between the beginning and the end of the interval training session. When comparing ME and HE periods: heart rate was significantly lower (155 +/- 12 vs. 210 +/- 9 ms, p < 0.001), LF spectral energy (0.04 - 0.2 Hz) was significantly higher (ME: 6.94 +/- 4.80 and HE: 0.24 +/- 0.14 ms(2) . Hz (-1), p < 0.001) whereas HF (0.2 - 2 Hz) was significantly lower (ME: 7.09 +/- 2.24 and HE: 10.60 +/- 3.64 ms(2) . Hz (-1), p < 0.05). In relative terms, ME showed similar results in both LFn (LF/LF+HF) and HFn (HF/LF+HF) whereas HE showed a large prevalence of HFn energy compared to LFn (p < 0.001). The difference in LF/HF ratio between the two exercise conditions was significant (1.14 +/- 0.92 vs. 0.09 +/- 0.12, p < 0.001). Exercise repetition induced a significant increase in heart rate between the beginning and the end of the interval training session (207 +/- 10 beats . min (-1) vs. 212 +/- 9 beats . min (-1), p < 0.001) whereas LF energy decreases (1.54 +/- 1.65 vs. 0.32 +/- 0.24 ms(2) . Hz (-1), p < 0.01) and HF energy remained constant (10.79 +/- 4.10 vs. 10.40 +/- 3.35 ms(2) . Hz (-1), NS). This study confirmed the results observed in humans during heavy exercise conditions with a large prevalence of HF in contrast to LF, this prevalence increasing with exercise repetitions. The observed decrease in LF/HF ratio could provide an index of hyperpnea in horses during interval training.

Descriptors: trotting horses, interval training, exercise intensity, heart rate.


NAL Call Number: SF955.E6

Descriptors: horses, French trotters, effect of age, effect of training, physiological response.


Descriptors: horses, racehorses, training methods.


NAL Call Number: SF603.D48

Descriptors: horses, training techniques, natural training method.

Language of Text: German with an English summary.


ISSN: 0021-8812.

NAL Call Number: 49 J82

Descriptors: horses, Arabian horses, creatine monohydrate, aerobic training, gluteus medius.

De D'Angelis, F.H., M.D.S. Da Mota, E.V.V. Freitas, G.C. De Ferraz, A.R. Abrahao, J.C. De Lacerda Neto, and A. De

Descriptors: Arab, conditioning, creatine, fat thickness, feed supplements, height, lactic acid, longissimus dorsi, muscular hypertrophy, training of animals, ultrasonography, horses.

Language of Text: Portuguese with an English summary.


Descriptors: horses, exercise, training, creatinine, serum lactate concentration, cortisol levels, age variation, training level variation.

Language of Text: English with a Portuguese summary.


NAL Call Number: SF601.A46

Descriptors: animal handling, training animals, neonates, maternal behavior.


NAL Call Number: 49 AR23

Descriptors: horses, mares, genetics, heretability, rider, trainer, performance.


Online: http://www.haras-nationaux.fr

Descriptors: animal behavior, training of animals, horses.

Language of Text: French.

Notes: Describes the training of horses, including techniques used for training horses, assessment and analysis of training.


NAL Call Number: 447.8 J825

Descriptors: horses, mares, training, hepatic function.


NAL Call Number: 41.8 D482

Descriptors: horses, training, cortisol response, salivary cortisol.

Language of Text: German.


NAL Call Number: SF601.V38

Descriptors: horses, neutrophil function, phagocytosis, oxidative metabolism, aerobic exercise, anerobic exercise, training.

**NAL Call Number:** 41.8 R312

**Descriptors:** horses, training, gluteal muscle, anaerobic activity.


**NAL Call Number:** SF285.3.W43 2002

**Descriptors:** management practices, racehorses, lameness, animal welfare, environmental risk factors, fatigue, effects of excessive training and inadequate recovery periods, fluid balance.


**Descriptors:** horses, racehorses, training, physiological response.


**Descriptors:** horses, response to endurance training, hemograms.


**Abstract:** 63 Standardbred horses in training with variable clinical signs, ranging from poor performance to poor body condition and recurrent abdominal discomfort, underwent endoscopic examination of the oesophagus, stomach and proximal duodenum. 59 horses (93.6%) had endoscopic evidence of ulcerative lesions of the nonglandular mucosa of the stomach, which were classified, according to MacAllister et al. (1997), from grade 0 to grade 5 for severity. Most horses had lesions ranging in severity from grade 3 to grade 5. This study confirms the high prevalence of gastric lesions in Standardbred racehorses, in agreement with what has been reported for Thoroughbred racehorses, suggesting a similar influence of management factors predisposing to ulcer development.

**Descriptors:** Standardbred racehorses, disease surveys, stomach ulcers, endoscopy, feeding systems, management factors may predispose horses to ulcer development, gastrointestinal disorders.

**Language of Text:** Italian.


**NAL Call Number:** 41.8 N483

**Descriptors:** horses, early training, carpus, hyaline cartilage, calcified cartilage, bone morphology, bone density.


**Descriptors:** abnormalities, bone density, bones, cartilage, collagen, joint diseases, joints animal, muscles, musculoskeletal system, racehorses, skeleton, tendons, Thoroughbred, training of animals, horses.


**NAL Call Number:** 41.8 N483
Abstract: AIMS: This is the first in a series of papers reporting studies in 2-year-old Thoroughbred racehorses that aimed to determine the response of musculoskeletal tissues to early training on grass and sand racetracks. In this paper, the experimental set-up of the whole study is described, and nutritional, workload, and clinical, radiographic and pathological outcomes are reported, including semi-quantitative assessment of macroscopic changes in articular cartilage. METHODS: The study group comprised 14 two-year-old Thoroughbred fillies reared entirely at pasture. Of these, seven were selected by a licensed racehorse trainer to undergo a 4-week period of initial training in which they were taught to accept saddle and rider, followed by a 13-week period of flatrace training at a racetrack (Weeks 1-13); the other seven fillies were confined to large grass enclosures and were not trained. Nutrient, including macro- and trace-element intakes were estimated. Distances cantered or galloped and average velocities were quantified for the trained horses. All horses were observed daily, weighed approximately weekly, and underwent a clinical lameness examination at Weeks 5, 9 and 13. Distal forelimbs were radiographed prior to Week 1, during Weeks 7-8, and again at the end of the study, when macroscopic changes in articular cartilage of the proximal surface of the proximal phalanx were also scored after staining with India ink. RESULTS: Dietary intakes met or exceeded recommended requirements for all nutrients except sodium, which was low in the trained horses. Bodyweight increased throughout the study in the untrained horses, and increased until Week 7 and then decreased slightly in the trained horses. Mean velocity data were used to define three stages of the training programme: Stage 1 comprised canter in Weeks 1-4; Stage 2 comprised canter in Weeks 5-8; and Stage 3 comprised canter in Weeks 9-13 and galloping twice weekly. Four of seven horses completed training. These covered a mean distance of 179.2 km at mean velocities (excluding gallops) of 7.63 m/sec (SD 0.58), 8.99 m/sec (SD 0.56), and 8.43 m/sec (SD 0.74) for Stages 1-3, respectively, and galloped 4.45 km at 14.4 (SD 0.1) m/sec. The three horses that did not complete training became lame in Weeks 9, 10 and 11, and covered 147.9 km at velocities of 7.38 m/sec (SD 0.44), 8.88 m/sec (SD 0.33) and 8.43 m/sec (SD 0.59) and galloped 2.1 km. Overall, slight or intermittent lameness in trained horses was noted on 76/655 (12%) of horse observation days. Swelling was evident on 284/655 (41%) of horse observation days in the metacarpophalangeal (MCPJ) and metatarsophalangeal (MTPJ) joints (92%), palmar metacarpal tendon region (7%) or carpus (1%). Swelling of the MCPJ or MTPJ was not associated with obvious lameness. Radiographic changes were minor and no gross lesions in bone or tendon tissue were evident except for one case of dorsal metacarpal disease. Post mortem, the cartilage of some MCPJ and MTPJ had obvious wear lines and high lesion scores, which were not consistently related to clinical evidence of pain, lameness or joint swelling. Mean lesion scores were not significantly different between the MCPJ and MTPJ, or between trained and untrained horses. CONCLUSIONS: Workload can be readily quantified in racehorses under semi-commercial training conditions. Obvious lesions in cartilage of the MCPJ or MTPJ had obvious wear lines and high lesion scores, which were not consistently related to clinical evidence of pain, lameness or joint swelling. Mean lesion scores were not significantly different between the MCPJ and MTPJ, or between trained and untrained horses. CLINICAL RELEVANCE: Workload data in racing horses are likely to be highly relevant for studying the pathogenesis of changes in bone, tendon and cartilage during training, for training management and for risk analysis in racehorse populations. Although obvious cartilage lesions produced little clinical effect, such lesions have previously been shown to be progressive and to prejudice athletic capability. Detection of such occult lesions in young horses will require more sophisticated detection methods.
Descriptors: training methods for performance horses, three-day events, physiology, horse health, athletic development, mental development, horse-rider relationship.

Gehlen, H., S. Marnette, K. Rohn, L. Kreienbrock, and P. Stadler (2005). Prazisionskontrolle echokardiographischer links-ventrikulärer funktionsparameter durch wiederholte messungen an drei aufeinanderfolgenden tagen bei trainierten und trainierten warmblutpferden. [Day to day variability of left ventricular echocardiographic parameters by repeated measurement at 3 days in trained and untrained warmblood horses]. Deutsche Tierarztlciche Wochenschrift 112(2): 48-54. ISSN: 0341-6593.
Descriptors: cardiovascular system, transport and circulation, methods and techniques, veterinary medicine, random effects model, mathematical and computer techniques, left ventricular echocardiography, laboratory techniques, imaging and microscopy techniques, day to day variability.
Language of Text: German.

NAL Call Number: SF955.E6
Descriptors: horses, training response, muscle metabolism, oxygen consumption, gluteal muscle, epinephrine, blood chemistry, muscle glycogenolysis.

NAL Call Number: TRANSL 22570
Descriptors: horse, training response, thermoregulation, thermography.

NAL Call Number: S192.R4
Descriptors: horses, Thoroughbreds, ultrasonograph, superficial digital flexor tendon, deep digital flexor tendon, tendon cross sectional area, effects of exercise, training techniques.
Language of Text: Portuguese.

Descriptors: horses, racehorses, training, training management, metabolism, training response.

NAL Call Number: S13.A28
Abstract: Effect of training including training and resting periods in a group of seven race horses on nitrogen level and liver profile was investigated. The training process was divided into four parts. 1 - the end of racing season, 2 - the end of the resting period, 3 - the end of quantitative training and 4 - the end of qualitative training. Level of urea in blood serum was within the reference limits, with a tendency towards increased values in the 1st and the 2nd period (5.07 - 5.79 mmol l** (-1). The average values of global protein, AST, ALT and bilirubin varied within the reference levels in the first two periods. In the 3rd and 4th periods the level of global protein, AST and bilirubine increased significantly in comparison with the 1st and 2nd period of the training
Descriptors: racehorses, nitrogen metabolism, blood serum, liver, bilirubin, biochemical reactions, nitrogen levels, effects of training, resting periods.

Language of Text: Slovak with an English summary.


NAL Call Number: S13.A28

Descriptors: horses, racehorses, nutrition, metabolism of nitrogen, training, serum nitrogen, bilirubin, liver enzyme activity.

Language of Text: Slovak with an English summary.


Descriptors: reining horses, horse health, training methods, exercise tests, interval training.


Descriptors: horses, training effects, blood chemistry, exercise, performance.


NAL Call Number: SF601.V484

Descriptors: horses, Thoroughbreds, training response, age variation, sex variation, fitness variation, plasma aspartate aminotransferase, creatine kinase.


Abstract: Global Positioning Systems (GPS) are considered suitable to monitor the position and velocity of horses during cross-country competition or in training. Furthermore, simultaneous recording of life data such as heart rate could be useful to assess the horse's condition during exercise. To test the suitability and reliability of a commercially available GPS system with integrated heart rate recording system and with built in GSM for data transmission, the Fidelak Equipilot Type EP-2003-15/G-2.11 (EP-15/G) was evaluated first for reliability of pulse recording from a pulse generator within the physiological range of horses; furthermore distance, velocity and heart rate recordings were carried out on a standard 1000 m field track with five repetitions. Agreement (% deviation from actually measured distance and from stopwatch-distance based velocity calculations) and variability (Coefficient of Variation for distance, velocity, heart rate) were calculated. From the results it was safe to assume that the heart rate sensor recorded horse heart rates at a high degree of accuracy. Overall distances and velocities are in high agreement with actually measured values. However, overall variability expressed in terms of relative variability (C.V.) is smaller for distance recording (C.V. 0.68%) when compared to velocity (C.V. 1.01%). The system tested is suitable and reliable for simultaneously recording of distance, velocity and heart rates for horses during cross country exercise. GPS-based monitoring of movement along with simultaneous recording of physiological data and the possibility to call upon data will not only be of benefit for training horses or for surveillance during competition, it may also be suitable for distant patient monitoring and in behavioural studies as well as in veterinary medicine in general.

Descriptors: usage of global positioning systems, GPS, reliability assessment, competition, training.
NAL Call Number: 41.8 Am3A
Descriptors: horses, yearlings, early training, incidence of training difficulty.

NAL Call Number: 49 J82
Descriptors: horses, weanlings, bone mass, housing, confinement, exercise protocol, skeletal strength, diagnostic techniques.

NAL Call Number: SF951.E62
Descriptors: horses, early training, nutrition, calcium.

NAL Call Number: SF277.J37
Descriptors: horses, Thoroughbreds, training protocol, distance training, aerobic capacity.

NAL Call Number: SF277.J37
Descriptors: horses, Thoroughbreds, cardiac function, effects of training, exercise intensity variation.

NAL Call Number: 49 J82
Descriptors: horses, Tennessee Walking horses, yearlings, training methods, temporal variables.

Descriptors: horses, muscles, gluteus medius, training effects, jumping, fibrillar composition, evaluation techniques.
Language of Text: Spanish with an English summary.

NAL Call Number: 49 AR23
Descriptors: horses, stallions, behavior, training.

NAL Call Number: SF955.E6
Descriptors: Standardbreds, race training, epidemiology, sex and age difference correlation, gastric ulcers.

**Descriptors:** horses, training, evaluation methods.


**NAL Call Number:** SF1.R6

**Descriptors:** horses, stallions, performance evaluation methods, genetics.

**Language of Text:** Polish with an English summary.


**NAL Call Number:** SF1.R6

**Descriptors:** horses, stallions, training, heart rate, performance testing methods.

**Language of Text:** Polish with an English summary.


**NAL Call Number:** 20.5 St43

**Descriptors:** horses, Arabian horses, nutrition, effects of training, carbohydrate metabolism, lipid metabolism.

**Language of Text:** Polish.

Kasashima, Y., D. Eto, K. Kusano, S. Hobo, and Japan Tendinitis Researching Project Team (2001). **Comparison of the method of cold therapy to equine limbs after training, with the aim of preventing tendinitis.** *Journal of Equine Science* 12(3): 96. ISSN: 1340-3516.

**NAL Call Number:** SF277.J37

**Descriptors:** horses, training, exercise, tendinitis prevention, cold therapy methods, meeting abstract.

**Notes:** Meeting Information: 42nd Annual Meeting of Investigation and Research Concerning the Racehorses. Part II. Kudan Kaikan, Tokyo, Japan; 5-6 December, 2000.


**NAL Call Number:** 41.8 Am3A

**Descriptors:** ponies, training, oxygen consumption.


**NAL Call Number:** 41.8 M463

**Descriptors:** horses, Arabian horses, nutrition, effects of training, carbohydrate metabolism, lipid metabolism.

**Language of Text:** Polish.


**NAL Call Number:** 447.8 J825

**Abstract:** Exercise training improves functional capacity in aged individuals. Whether such training reduces the severity of exercise-induced muscle damage is unknown. The purpose of the present study was to determine the effect of 10 wk of treadmill exercise training on skeletal muscle oxidative capacity and exercise-induced ultrastructural damage in six aged female Quarter horses (>23 yr of age). The magnitude of ultrastructural muscle damage induced by an incremental exercise test before and after training was determined by electron microscopic examination of samples of triceps, semimembranosus, and masseter (control) muscles. Maximal aerobic capacity increased 22% after 10 wk of exercise training. The percentage of type IIA myosin heavy chain increased in semimembranosus muscle, whereas the percentage of type IIX myosin heavy chain decreased in triceps muscle. After training, triceps muscle showed significant increases in activities of both citrate synthase and 3-hydroxyacyl-CoA-dehydrogenase. Attenuation of exercise-induced ultrastructural muscle damage occurred in the semimembranosus muscle at both the same absolute and the same relative workloads after the 10-wk conditioning period. We conclude that aged horses adapt readily to intense aerobic exercise training with improvements in endurance, whole body aerobic capacity, and muscle oxidative capacity, and heightened resistance to exercise-induced ultrastructural muscle cell damage. However, adaptations may be muscle-group specific.

**Descriptors:** aged horses, training adaptation, exercise training, muscle damage, treadmill exercise, skeletal muscle oxidative capacity, endurance, whole body aerobic capacity.


**NAL Call Number:** 41.9 D23

**Descriptors:** racehorses, animal training, alternative methods of training, training intensity, physical activity, acid base equilibrium, lactate production, cardiovascular system, swimming.

**Language of Text:** Danish.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, Thoroughbreds, training, incremental exercise test, evaluation techniques for training effects.


**Online:** http://www.uspto.gov/patft/index.html

**Descriptors:** equipment apparatus devices and instrumentation, animal husbandry, agriculture, free reign walking machine, field equipment.


**NAL Call Number:** QL750.A6

**Descriptors:** round pen, horse whisperers, horse behavior, training, learning, following in pen did not translate to following in pasture, dominance relationship.

NAL Call Number: QL750.A6

Descriptors: horses, young animals, Thoroughbreds, training of animals, frequency, duration, heart rate, learning, horse riding, saddles, equipment, accuracy.

Notes: In the special issue: *Equine Behavior* edited by K. Houpt and R. Rudman.


NAL Call Number: 41.8 Am3A

Descriptors: horses, racehorses, Thoroughbreds, respiratory system, lung collagen, training effects.


NAL Call Number: SF105.A1Z8

Descriptors: horses, stallions, endocrine system, effects of training, performance, reproductive system, testicular function, semen production.


NAL Call Number: QL750.A6

Descriptors: temperament, early experiences, handling of young horses, Anglo-Arab, foals, weaning, optimal period for handling.


NAL Call Number: QL750.A6

Descriptors: horse breeds, training animals, animal age, animal behavior, learning, human animal relations, Welsh Pony horse breed.


NAL Call Number: SF955.E6

Descriptors: horses, Standardbreds, exercise, training stages, morphology of sweat glands, carbonic anhydrase, light microscopic image analysis method.


Descriptors: horses, jumping performance prediction, genetics, video image analysis.

Language of Text: Polish with an English summary.


Abstract: The AA carried out an echocardiographic study of the cardiac changes resulting by different training
protocols in horses. 42 clinically healthy horses, not previously trained, were divided in 2 groups and underwent different training programs (endurance and speed training). 3 echographs were used to assess the following echocardiographic parameters: Left Ventricular Diastolic Diameter (LVDD), Left Ventricular Myocardial Mass (LVMM), Left Ventricular Diastolic Volume (LVDV), Relative Wall Thickness (RWT) and Left Ventricular Diastolic Volume/Left Ventricular Myocardial Mass ratio (LVDV/LVMM). The endurance-trained horses showed increases in LVDD (16.06%), LVDV (22.82%) and LVMM (32.54%) values, while RWT and LVDV/LVMM ratio were constant. In speed-trained horses LVDD and LVDV values were unchanged (0.062 and 0.25%, respectively), LVMM and RWT raised (26.40 and 19.40%, respectively), while LVDV/LVMM ratio decreased (21.37%).

Descriptors: echocardiography, animal physiology and performance, effect of training on cardiovascular system, heart rate, echography, blood circulation.

Language of Text: Italian.


Descriptors: horses, muscles, effects of training, oxidative capacity of muscle fibers, enzyme activity, muscle fiber area, capillary density, aerobic capacity.

Language of Text: Spanish with an English summary.


NAL Call Number: QL750.A6

Descriptors: horses, foals, age variation, effects of handling, training.


NAL Call Number: 49 J82

Descriptors: horses, racehorses, Standardbreds, race training, immune function, clenbuterol, inflammatory airway disease management.


NAL Call Number: 49 J82

Descriptors: horses, age variation, exercise, training stages, plasma beta-endorphin, cortisol, immune system.

Notes: Meeting Information: Meeting of the American Society of Animal Science and the American Dairy Science Association, Quebec City, Quebec, Canada; July 20-25, 2002.


NAL Call Number: SF951.J65

Descriptors: horses, calcium, phosphorus, supplementary feeding, bone density, metabolism, bones, young animals, exercise.


NAL Call Number: 49 J82

Descriptors: horses, blood chemistry, exercise, training, evaluation methods, physiological evaluation.
Descriptors: racehorses, training, performance analysis, upper respiratory tract abnormalities, laryngeal hemiplegia, cardiac disease, lameness, electrocardiography, tread mills.

NAL Call Number: 41.8 Am3
Descriptors: horses, transport, competition, confinement, exercise, stress, gastric ulcer causation, management practices.

NAL Call Number: 447.8 J825
Descriptors: horses, physiology, exercise, effects of training, sweat response.

NAL Call Number: SF955.E6
Descriptors: horses, racehorses, training, exercise, gluteal muscle, plasma, potassium regulation, oxygen consumption, adenosinetriphosphatase.

NAL Call Number: SF605.N672
Descriptors: horses, joint diseases, bone diseases, bone fractures, diagnostic techniques, radiography, computed tomography, imagery, scintigraphy, synovial fluid, serum, Colorado, magnetic resonance imaging, 3-D computed tomography, subchondral bone disease, serum markers, joint modeling, optical coherence tomography.
Notes: Meeting Information: Meeting held January 13-17, 2001 in Orlando, Florida. In the volume: Large Animal. Part of a three volume set.

Descriptors: horses, effects of training, renal function.
Notes: Meeting Information: 46th Annual Meeting of the American College of Sports Medicine, Washington, D.C., USA; June 2-5, 1999.

NAL Call Number: 44.8 J822
Descriptors: horses, metabolism, training, exercise, management techniques, CO2 levels, meeting abstracts.
Notes: Meeting Information: Meeting of the American Society of Animal Science and the American Dairy Science Association, Quebec City, Quebec, Canada; July 20-25, 2002.

Medica, P., E. Fazio, A. Ferlazzo, D. Alberghina, and S.J. Wickler (2002). Effetto dell' allenamento sulla risposta di cortisolo e iodotironine totali e libere di cavalli a test d' esercizio standardizzati su treadmill. [Effect of
Adrenocortical and thyroid responses of horses were evaluated after Standardized Exercise Tests (SET) during a training protocol of two months. A significant increase of circulating cortisol and free triiodothyronine levels 5 and 15 min after SET was detected. A significant effect of training on total tiroxine levels was recorded.

Descriptors: treadmill exercise tests, horses, effects of training, iodohyronine, blood plasma levels of cortisol, glucocorticoids, physical activity.

Language of Text: Italian.

NAL Call Number: SF951.J65
Descriptors: foals, imprinting, training of animals.

NAL Call Number: SF951.J65
Descriptors: horses, training of animals.

NAL Call Number: Videocassette no. 2593
Abstract: Demonstrates techniques for training newborn foals to accept grooming, hoof trimming, clipping, veterinary examinations, trailer loading and unexpected objects.
Descriptors: training foals, imprinting, equine psychology, behavior of foals.

NAL Call Number: SF604.J342
Descriptors: horses, training methods, exercise alternatives, swimming, skeletal muscle response.

NAL Call Number: 41.8 Am3A
Descriptors: horses, Thoroughbreds, training methods, skeletal muscle response.

NAL Call Number: 41.8 Z5
Descriptors: training, success evaluation methods.

Descriptors: horses, training level assessment, exercise, blood chemistry analysis, biochemical response analysis.
Language of Text: Spanish with an English summary.


**Descriptors:** horses, Andalusians, effects of training, movement patterns.


**Descriptors:** cardiac output, cardiac rhythm, chloride, electrocardiography, electrolytes, exercise, heart, heart rate, polarization, potassium, racehorses, sodium, training, ventricles, horses.


**Descriptors:** horses, effects of training, joints, carpus, articular cartilage, cartilage breakdown.


**Descriptors:** horses, training, calcium, phosphorus, mineral nutrition, nutrient intake, dosage, feed supplements, bone density, urine analysis, feces composition, blood chemistry, magnesium, nutrient balance.

**Notes:** Meeting Information: Paper presented at the Equine Nutrition and Physiology Society Annual Symposium, Fort Worth, Texas, USA; May 28-31, 1997.


**Descriptors:** training methods, ethological characteristics, round pen training, effect of eye contact with trainer on behavior.


**Descriptors:** horses, Thoroughbreds, autonomic nervous system, effects of training, effects of handling.


**Descriptors:** horses, Thoroughbreds, training, aerobic capacity, exercise, oxygen transport evaluation, diagnostic methods, cardiovascular system, respiratory system.


**Descriptors:** horses, Thoroughbreds, endurance training, speed evaluation.
collagen fibril populations in the suspensory ligament and deep digital flexor tendon of young Thoroughbreds. *American Journal of Veterinary Research* 59(1): 64-68. ISSN: 0002-9645.

**NAL Call Number:** 41.8 Am3A

**Descriptors:** horses, effects of training, tendon composition, ligament composition.


**NAL Call Number:** 41.8 N483

**Descriptors:** horses, Thoroughbreds, race performance, training methods, animal health, racing industry.


**NAL Call Number:** 41.8 N483

**Descriptors:** horses, racehorses, race performance, effect of training surface, effect of time period.


**NAL Call Number:** 41.8 N483

**Descriptors:** horses, Thoroughbreds, tendons, cross-sectional area, echogenicity, effects of early training, ultrasonography.


**NAL Call Number:** 41.8 M463

**Descriptors:** horses, effects of intensive training, exercise, biochemical indices, cardiovascular system.

**Language of Text:** Polish.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, effects of training, exercise, skeletal muscle.


**NAL Call Number:** SF601.J65

**Descriptors:** horses, racehorses, exercise, training, performance analysis, echocardiographs.

**Notes:** Meeting Information: 19th Annual American College of Veterinary Internal Medicine Forum, Denver, CO, USA; May 23-26, 2001.


**NAL Call Number:** SF951.E62

**Descriptors:** horses, Thoroughbreds, effects of training, bone mineral content.

**Descriptors:** analytical methods, bone density, bone mineralization, bones, techniques, Thoroughbred, horses.  
**Language of Text:** Portuguese with an English summary.

**Descriptors:** horses, effects of training, skeletal changes.

**NAL Call Number:** 41.8 R312  
**Descriptors:** horses, training, exercise, circulatory system.

**NAL Call Number:** SF955.E6  
**Descriptors:** horses, exercise, training of animals, adverse effects, lymphocytes, macrophages, neutrophils, phagocytosis, bronchoalveolar lavage, blood, oxidation.

**NAL Call Number:** QL750.A6  
**Descriptors:** training horses, stalls, pastures, heart rate, cortisol, blood plasma, animal behavior, Arabian horses, learning ability.  
**Notes:** In the special issue: Equine Behavior edited by K. Houpt and R. Rudman.

**NAL Call Number:** 41.8 Am3A  
**Descriptors:** horses, training, muscle change assessment methods, muscular biopsy.

**NAL Call Number:** SF955.E6  
**Descriptors:** horses, endurance training, effects of exercise, skeletal muscle.

**Descriptors:** horses, effects of training, skeletal muscle, muscular composition.

**NAL Call Number:** 41.8 N483  
**Descriptors:** horses, race training, exercise, workload determination methods, injury, lameness.

**NAL Call Number:** 41.8 N483  
**Descriptors:** horses, race training level variation, kinematic parameters, lameness, stride variation.

**Descriptors**: foals, Thoroughbreds, handling techniques, training, effect of early handling, equine behavior.

**Language of Text**: English with an Italian summary.


**NAL Call Number**: 41.8 T445

**Descriptors**: horses, effects of training, blood chemistry.


**Abstract**: The AA performed a standardised exercise test on treadmill and track to evaluate increasing fitness in endurance riding horses. The LDH and CPK modifications during the test on treadmill showed LDH patterns as an indicator of the early stages of training, while CPK patterns as an indicator of more advanced level.

**Descriptors**: endurance horses, fitness evaluation, treadmill exercise test, physical activity, isoenzymes, muscles, lactate dehydrogenase, creatine kinase, enzymatic analysis.

**Language of Text**: Italian.


**NAL Call Number**: 49 J82

**Descriptors**: horses, effects of training, metabolites, muscles.


**Abstract**: OBJECTIVE: To investigate the effects of early training for jumping by comparing the jumping technique of horses that had received early training with that of horses raised conventionally. ANIMALS: 40 Dutch Warmblood horses. PROCEDURE: The horses were analyzed kinematically during free jumping at 6 months of age. Subsequently, they were allocated into a control group that was raised conventionally and an experimental group that received 30 months of early training starting at 6 months of age. At 4 years of age, after a period of rest in pasture and a short period of training with a rider, both groups were analyzed kinematically during free jumping. Subsequently, both groups started a 1-year intensive training for jumping, and at 5 years of age, they were again analyzed kinematically during free jumping. In addition, the horses competed in a puissance competition to test maximal performance. RESULTS: Whereas there were no differences in jumping technique between experimental and control horses at 6 months of age, at 4 years, the experimental horses jumped in a more effective manner than the control horses; they raised their center of gravity less yet cleared more fences successfully than the control horses. However, at 5 years of age, these differences were not detected. Furthermore, the experimental horses did not perform better than the control horses in the puissance competition. CONCLUSIONS AND CLINICAL RELEVANCE: Specific training for jumping of horses at an early age is unnecessary because the effects on jumping technique and jumping capacity are not permanent.

**Descriptors**: early training, kinematic analysis, jumping technique, jumping capacity.


Online: 9039336768

NAL Call Number:
Descriptors: effects of early training on horses, show jumping, training of animals, kinematics, kinetics, forecasting future performance, saddle performance, horse mechanics.
Notes: Thesis.


Descriptors: horses, stallions, behavior, movement characteristics, effects of training.
Language of Text: Polish with an English summary.


Descriptors: horses, transport, stress, safety, behavior, physiology, trailering techniques, Tellington Touch Equine Awareness Method, TTEAM.


Descriptors: horses, Standardbreds, training methods, effects of training, performance.


Descriptors: horses, effects of training, early training, nutrition, vitamins.


Descriptors: horses, animal training, animal learning, rearing techniques, mental ability, behavior, feeding habits, animal husbandry methods, behavior, feeding habits.
Language of Text: Danish.


Descriptors: horses, foals, behavior, imprint training, training methods, handling, limb handling.


Descriptors: play behavior, training, kinematic response, emotional response, stimuli.


Descriptors: horses, racehorses, nutrition, training, mineral absorption, calcium, phosphorus, magnesium.


**NAL Call Number:** TRANSL 30948  
**Descriptors:** horses, effects of training, jumping, blood chemistry.


**Online:** 9039326517  
**Descriptors:** training of horses, food supply, homeostasis, skeletal muscle, supply balance, potassium, effects of training and food supply.  
**Notes:** Thesis.

**NAL Call Number:** SF955.E6  
**Descriptors:** foals, skeletal muscle, exercise, sodium, potassium, adenosinetriphosphatase, muscles, water content, gluteus medium, semitendinosus, masseter muscle.

**Descriptors:** horses, effects of training, effects of overtraining, gas exchange, respiratory system, circulatory system.  
**Notes:** Meeting Information: 42nd Annual Meeting of the American College of Sports Medicine, Minneapolis, Minnesota, USA; May 31-June 3, 1995.

**NAL Call Number:** S13.A28  
**Abstract:** Change in blood serum macroelements in a group of seven race horses during training over a distance of 1,000 to 2,800 m were investigated. Blood samples were collected in order to assess Ca, inorganic P, Mg, Na and K during three training periods, including a testing period, as follows: the end of racing period (1); the end of resting period (2); the end of preparation period consisting of two phases - quantitative (3) and qualitative (4). A significant effect of the training process on blood serum levels of calcium, inorganic phosphorus and potassium was confirmed. Higher levels of inorganic P and K were observed at the end of the second and the third under a moderate physical rate of horse. Lower levels of inorganic P and K were characteristic of the higher physical activity during the racing season (1) and the qualitative phase of training (4).  
**Descriptors:** racehorses, animal training, metabolism, blood serum macroelements, distance of training, levels of calcium, inorganic phosphorus and potassium.  
**Language of Text:** Slovak with an English summary.

**Descriptors:** horses, Thoroughbreds, early training, performance indicators, heart rate, velocity, cardiovascular system.  
**Language of Text:** English with a German summary.  
**Notes:** Meeting Information: Association for Equine Sports Medicine, 15th Meeting on Equine Welfare and Sports Medicine, Bonn, Germany; June 24-28, 1996.

**Abstract:** This study measured parameters of stress in recreational, trained horses (REC; n = 7) and elite (International Grand Prix level) trained, dressage horses (DRES; n = 5). The training of the DRES horses uses
an unnatural head-neck position (Rollkur), whereas in the REC horses such training techniques are not common. The study measured stress by using heart rate variability analysis for 30 min postfeeding in the morning and 30 min postexercise after a morning training session. The study found no significant difference at rest between the REC and DRES horses. During the posttraining measurements, however, the DRES horses showed, among others, a less sympathetic and increased parasympathetic dominance. These results suggest that DRES horses tend to have less acute stress than do REC horses postexercise. The findings of this study suggest maintaining the health and well-being of DRES horses despite nonnatural, biomechanical positions.

Descriptors: training techniques, stress analysis, stress in trained recreation horses vs. trained dressage horses, biomechanics, heart rate variability analysis, equine welfare.


NAL Call Number: SF955.E6
Descriptors: horses, racehorses, gastrointestinal system, gastric ulceration, effects of training, stress, serum cortisol levels.


NAL Call Number: SF955.E6
Descriptors: horses, racehorses, Thoroughbreds, bone disease, effects of training, risk factors.


NAL Call Number: SF955.E6
Descriptors: horses, racehorses, Thoroughbreds, training, epidemiological studies.


NAL Call Number: SF955.E6
Descriptors: horses, training, calcium, endocrine system, homeostasis.


NAL Call Number: 41.8 Z5
Descriptors: horses, training, bone activity, evaluation methods.


Online: http://www.blackwell-synergy.com/servlet/useragent?func=showIssues&code=jpn
Descriptors: calcium homeostasis, training regimens, treadmill training, draught load training, incline training, blood lactate, plasma total calcium, blood ionized calcium, blood pH, plasma inorganic phosphorus, plasma intact parathyroid hormone.


Descriptors: calcium metabolism, bone metabolism, hypocalcemia, training regimens, endurance training, dressage training, incline training.
**NAL Call Number:** SF951.J65
**Descriptors:** urinary glycosaminoglycans, keratan sulfate, chondroitin sulfate, cartilage, age variables, gender variables, training variables, osteoarthritis, ion exchange chromatography.

**NAL Call Number:** SF1.L5
**Descriptors:** horses, sporthorses, genetics, performance evaluation methods.

**NAL Call Number:** SF311.E9
**Descriptors:** horses, training of animals, animal behavior, Ohio.

**NAL Call Number:** SF281.D66 2005
**Descriptors:** horses, behavior, handling, training methods.

**NAL Call Number:** SF285.3.W43 2002
**Descriptors:** horse care, handling, natural behavior of horses, domestication, training, performance horses, conditioning to stimuli, learning processes, influence of early experience, motivational forces, prey species, development of abnormal behavior, innovative training methods.

**NAL Call Number:** 49 J82
**Descriptors:** horses, training levels, intense exercise, betaine.

**Online:** www.thepress.purdue.edu
**Descriptors:** handling procedures, learning facilitation techniques, positive and negative reinforcement, training methods.

**NAL Call Number:** SF955.E6
**Descriptors:** horses, effects of training, carpus, tarsus, bone modelling, treadmill training.

**NAL Call Number:** SF955.E6

**Descriptors:** horses, foals, behavior, training methodology, effects of imprint training.


**NAL Call Number:** QL750.A6

**Descriptors:** foals, age differences, training of animals, imprinting, newborn animals, heart rate, stimuli, escape responses, responses, animal handling.


**Abstract:** REASONS FOR PERFORMING STUDY: The low productivity associated with training and racing of young Thoroughbreds (TBs) in the UK due to athletic inability, injury and disease requires further study. OBJECTIVES: To identify the time points and causes of losses during growth and training phases of a cohort of 1022 TB foals born in 1999 up to the end of their third year. METHODS: Movement and fate of 1022 Thoroughbred foals conceived in 1998 and born live in 1999 were monitored from birth to age 3 years. Those (n = 562) that entered training age 2 and/or 3 years with one of 161 registered trainers in Britain or Ireland in 2001/2 were analysed as to their subsequent performance and the incidence of 9 common injuries or infective or metabolic illnesses. RESULTS: Of the 1022 foals identified, 537 (52%) entered training at age 2 years, 289 (28%) were exported, 60 (6%) were kept as 'stores' for National Hunt (NH) racing, 58 (6%) died or were destroyed, 25 (2%) were waiting to enter training at age 3 years, 17 (2%) were never intended for racing and 36 (4%) were untraceable. Race records showed that 327 (61%) of the 2-year-olds in training competed one or more times, 95 (18%) won and 165 (31%) were placed. Only 28 (5%) earned enough prize money to cover their training fees. Sore shins and inflammatory airway disease (IAD) were the 2 ailments most commonly encountered. In 2002, 431 (80%) of the previous year's 2-year-olds remained in training aged 3 years and 25 entered training having not raced previously. Of the 456 3-year-olds in training, 347 (76%) raced one or more times 138 (30%) won, 218 (48%) were placed and 78 (17%) recouped their training fees. Joint problems and sore shins were the ailments most commonly suffered and, with the exception of rhabdomyolysis ('tying up'), colts and geldings suffered a higher rate of musculoskeletal injuries than fillies. CONCLUSION: Previous reports of high nonrun and nonplaced rates, high incidence of injury and cost-ineffectiveness of 2-year-olds in flat-race training were confirmed. Potential relevance: This study lays the basis for further studies of the facets involved in wastage.

**Descriptors:** racing productivity, training, Thoroughbreds, athletic performance, injury, disease, growth and training.


**NAL Call Number:** 41.8 Am3A

**Descriptors:** horses, Thoroughbreds, effects of training, growth, musculoskeletal system.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, Thoroughbreds, cardiovascular system, echocardiography, cardiac hypertrophy, race training, exercise.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, Thoroughbreds, training level variation, age variation, cardiovascular system.


**NAL Call Number:** SF603.D48

**Descriptors:** horses, dogs, training methods, Tellington-Jones technique, clinical technique, veterinary medicine.

**Language of Text:** German with an English summary.
Transportation


**NAL Call Number:** SF601.V484

**Descriptors:** horses, transport, trailer safety, physiology, stress, animal welfare, meeting abstracts.

**Notes:** Meeting Information: Meeting held at Hartpury College, Gloucestershire, UK; July 12-13, 2003.


**NAL Call Number:** 41.8 Am3

**Descriptors:** bioterrorism prevention and control, horses, transportation, animal welfare, behavior, animal, security measures.


**Descriptors:** horse, transportation, animal welfare, literature reviews, effects of transportation on stress.

**Language of Text:** French.


**Abstract:** Circulating levels of total and free iodothyronines in horses before and after road transport of different length have been studied. The effects of age and breed of horses on iodothyronines levels after road transport have also been studied. Results showed a significant increase of T3 after transport of 60-120 km, in 6 and 12 years old horses, and in Thoroughbred. T4 is significantly increased after transport of 60-120 and 240-300 km, in 12 years old and in Sanfratellano horses. fT3 levels increased significantly in 12 years old Standardbred horses. A significant increase of fT4 after transport of 120-180 and 180-240 km was detected.

**Descriptors:** stallions, transport of animals, road transport, animal welfare, breeds animals, thyroid hormones, age, evaluation, animal performance, thyroid gland, stress, animal glands, body parts, endocrine glands, hormones, horses, taxa, transport.

**Language of Text:** Italian with an English summary.


**NAL Call Number:** HV4890.A3A37 1998a

**Descriptors:** horse transport, effect of transportation on stress, animal welfare, road travel, railway travel.
NAL Call Number: SF957.P7
Descriptors: horses, transport, stress, behavior, symptomatology.

NAL Call Number: SF957.P7
Descriptors: horses, transport, behavior, therapy.
Language of Text: French.

NAL Call Number: SF951.J65
Descriptors: horses, transportation, stress, blood composition, serum cortisol, creatine kinase.

Descriptors: horses, stress management, air transport.
Language of Text: English and Italian.

NAL Call Number: QL750.A6
Descriptors: density effects on displacement, trailer transport, effects of time, turns and acceleration, effects of stocking density on the number of falls and injuries.

NAL Call Number: 41.8 Au72
Descriptors: air transport of horses, Japanese encephalitis, flight cages, quarantine procedure, African horse sickness, disease prevention.


NAL Call Number: 49 J82
Descriptors: horses, transport of animals, duration, distance traveled, dehydration physiological, stress, water intake, starvation, water deprivation, weight losses, environmental temperature, relative humidity, blood chemistry, chloride, blood serum, respiration rate, heart rate, hydrocortisone, osmolarity, blood protein, blood
plasma, animal welfare.

NAL Call Number: 41.8 Am3
Descriptors: horses, transport, stress, hydration, body weight, blood analysis, body temperature, serum electrolyte concentration, fatigue.

NAL Call Number: QL750.A6
Descriptors: horses, transportation, balance, orientation preference.

NAL Call Number: SF1.L5
Descriptors: horses, transport of animals, stress, heart rate, muscles, muscle physiology, electromyography, gravity, posture.

NAL Call Number: SF601.V484
Descriptors: horses, transportation, animal welfare, animal safety.

Online: http://www.sciencedirect.com/science/article/B6T48-4KGX80T-1/d13d4a83a432b9028563ab6a1bb1ab89
NAL Call Number: QL750.A6
Descriptors: transportation of horses, slaughter horses, provision of an onboard watering system, drinking behavior, consumption of water, horses.

NAL Call Number: SF955.E6
Descriptors: horses, racehorses, stress, superoxide production, antioxidative ability, exercise, transport.

NAL Call Number: SF951.J65
Descriptors: horses, transportation, stress reduction, animal welfare, safety.

NAL Call Number: 41.8 M463
Descriptors: horses, transportation, stress, cardiovascular system, heart rate.
Language of Text: Polish with an English summary.

**NAL Call Number:** SF277.J37  
**Descriptors:** horses, long distance transport, nerve growth factor, evaluation methods, equine shipping fever, stress, pathogenesis factors.

**NAL Call Number:** SF277.J37  
**Descriptors:** horses, behavior, transportation, posture preference, directional preference.

**NAL Call Number:** SF951.E67  
**Descriptors:** horses, racehorses, air temperature, relative humidity, neuroleptics, analgesics, anesthetics, respiratory diseases, diagnosis, transport of animals, stress, domestic animals, drugs, horses, neurotropic drugs, organic diseases, temperature, transport, useful animals, working animals.

**Descriptors:** blood chemistry, body weight, crates, digestive tract, hematology, heart rate, hormones, hydrocortisone, immune system, livestock transporters, musculoskeletal system, respiratory system, stress, stress response, transport of animals, weight losses, horses.

**NAL Call Number:** SF955.E6  
**Descriptors:** horses, transportation, fitness, heat stress, acclimatisation, hydration, behavior.

**NAL Call Number:** SF604.J342  
**Descriptors:** horses, transporation, transportation-induced fever, pathogenesis, blood chemistry, microbial infection, granulocyte-colony stimulating factor.

**Descriptors:** animal welfare, disease control, disease prevention, dog diseases, horse diseases, sows, transport of animals, cattle, dogs, horses, pigs.

**NAL Call Number:** SF277.J37  
**Descriptors:** horses, mares, transportation, stress, effects of travel on the endocrine system, blood chemistry.

**NAL Call Number:** 41.8 J82  
**Descriptors:** horses, transport, stress, inflammatory response, respiratory system, effect of orientation, effect of
rest.


**NAL Call Number:** 41.8 J82


**NAL Call Number:** SF277.J37

**Descriptors:** horses, transport, stress, respiratory disease, respiratory system.


**NAL Call Number:** HV4701.A557

**Descriptors:** animal transport, restraint of animals, animal care equipment, animal behavior, animal welfare, blinkers.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, transport, stress, respiratory system, post transport respiratory disease, hematology.


**Descriptors:** transportation, European Union, animal welfare.


**NAL Call Number:** QL750.A6

**Descriptors:** horses, animal transport, air transportation, animal stress, animal behavior, animal physiology, posture, heart rate, physical activity, body temperature, animal welfare, balancing.


**NAL Call Number:** 49 J82

**Abstract:** Nine trailer loads of horses (n = 306) transported to slaughter facilities with distances ranging 596 to 2,496 km were studied to characterize the type of horses used in commercial markets and the physiological responses and number of injuries due to transportation under summer environmental conditions. Slaughter horse candidates were middle-aged (11.4 +/- .4 yr), possessed moderately fleshy body condition, weighed 432 +/- 3.3 kg, and were of Quarter Horse or Thoroughbred breeding. The mean weight loss during commercial transport was 4%. The percentage of injured horses was greater (P < .05) for two-tiered "potbelly" (29.2%) compared with straight-deck (8.0%) trailers; however, the stress indicators of cortisol and neutrophil:lymphocyte ratio and rectal temperature showed greater (P < .05) responses following transport in straight-deck trailers. As trip duration increased from 5 h 45 min to 30 h, muscle fatigue (lactate concentration) and dehydration (hematocrit and total protein concentration) were the major physiological considerations, especially in durations over 27 h. The percentage of horses injured was less (P < .05) in trailers with 1.14 to 1.31 m(2) of floor area per horse than in trailers with 1.40 to 1.54 m(2) of floor area per horse. However, most physiological responses (white blood cell count, total protein concentration, and neutrophil:lymphocyte ratio) to transportation were less (P < .05) in
horses provided with the greater floor area.

**Descriptors:** horses, slaughter, transport of animals, animal welfare, handling, stress, livestock transporters, long distance transport, duration, area, wounds, body condition, weight losses, body temperature, hydrocortisone, biochemical markers, neutrophils, lymphocytes, dehydration, hematocrit, lactic acid, protein content, blood chemistry.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, transport, cross tying, stress, respiratory disease, blood chemistry.


**NAL Call Number:** 49 J82

**Descriptors:** horses, weight losses, transport of animals, stress, summer, leukocyte count, neutrophils, lymphocytes, ratios, blood chemistry, hematocrit, blood protein, blood sugar, lactic acid, hydrocortisone, creatine kinase, enzyme activity, animal welfare.


**NAL Call Number:** SF955.E6

**Descriptors:** horses, transport, prolonged stress, immune system, nutrition, supplements.


**NAL Call Number:** SF105.A1Z8

**Descriptors:** horses, mares, pregnancy, transport, stress, endocrine system.

**Notes:** Meeting Information: 8th Annual Conference of the European Society for Domestic Animal Reproduction (ESDAR), Warsaw, Poland; September 23-25, 2004.


**NAL Call Number:** 41.8 M463

**Descriptors:** horses, mares, foals, transport, stress, endocrine system.

**Language of Text:** Polish.


**NAL Call Number:** QL750.A6

**Descriptors:** horses, transport, orientation, balance, behavior, stress.


**NAL Call Number:** SF955.E6

**Descriptors:** transport of animals, homeostasis, water balance, electrolytes, feed intake, water uptake, breeds animals, drinking habits, body weight, urine, feces, excretion, sodium, potassium, alkali metals, behavior, body fluids, feeding habits, nutrient uptake, Thoroughbreds, dehydration.


**NAL Call Number:** 41.8 T445

**Descriptors:** racehorses, saddle horses, stress associated with travel, animal health, transport of horses.
Transportation -- Web Resources

**Horse Trailer Maintenance and Trailering Safety.** Margentino, M.R.
*Description:* On the web site of the National Ag Safety Database, this page provides links to an article and fact sheets on trailer safety and transporting of horses.

**Trailer Safety.** Lamm, W.
*Online:* http://www.whmentors.org/saf/trailer.html
*Description:* Winter maintenance of trailer electrical system, undercarriage, interior and exterior body. Also provides a list of items to include in a First Aid kit.

**Trailer Safety.** Rietveld, G.
*Online:* http://www.omafra.gov.on.ca/english/livestock/horses/facts/info_trailering.htm
*Description:* How to determine safety and suitability of tow vehicle as well as trailer undercarriage, lights, hitch, tires, brakes, doors, ramps, and floorboards. Also lists items to include in a trailer emergency kit.

**Horse Trailering.** Rietveld, G. and B. Wright.
*Online:* http://www.omafra.gov.on.ca/english/livestock/horses/facts/info_trailering.htm
*Description:* Explains factors that can affect horses during transport and includes tips for minimizing stress as well as items to include in an emergency kit.

**Physiology, Balance, and Management of Horses During Transportation.** Stull, C.L.
Online: http://www.vetmed.ucdavis.edu/vetext/INF-AN/INF-AN_HORSTRANSPT.HTML

Description: How to assess and control equine stress during travel. Explains how to prepare your horse for travel as well as the elements of orientation and balance during transport and the effect of transport on metabolic and energy pathways. Also includes health issues and diseases associated with travel.

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Web Resources

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General Web Resources

**American Association of Equine Practitioners (AAEP).**


*Description:* A professional association of equine veterinarians whose mission is to improve the health and welfare of the horse, to further the professional development of its members, and to provide resources and leadership for the benefit of the equine industry. Under Resources, the AAEP provides disaster preparedness information and vaccination guidelines.

**Care Guidelines for Equine Rescue and Retirement Facilities.** *American Association of Equine Practitioners.*


*Description:* Guidelines that provide information on basic horse care and management as well as consideration for horses entering rescue or retirement facilities with unique health challenges.

**Code of Practice for Welfare Organisations Involved in the Keeping of Horses, Ponies, and Donkeys.** *UK. National Equine Welfare Council.*

*Online:* http://www.newc.co.uk/law/equine-code-of-practice/

*Description:* The NEWC in the United Kingdom put together this code of practice which outlines minimum standards of equine care to express that a high standard of husbandry is fundamental to welfare.

**Equine Health Monitoring and Surveillance.** *USDA. Animal and Plant Health Inspection Service.*

*Online:* http://www.aphis.usda.gov/vs/nahss/equine/

*Description:* Provided by the National Animal Health Surveillance System (NAHSS), this page provides information on equine health monitoring and surveillance activities conducted by many Federal and State government agencies.


*Description:* Sets out minimum standards of care and recommended practices required to appropriately look after a horse.

**equine-reproduction.com.**


*Description:* Information on safe, productive and healthy equine reproduction techniques, with a special emphasis on promoting newer advanced technology.

**Equine Species Working Group.**

*Online:* http://www.equinespeciesworkinggroup.com/

*Description:* A United States task force that is evaluating the concept of a national ID system in order to determine if the horse industry could develop standards for equine identification.

**Horse Breeds.** *Oklahoma State University. Department of Animal Science.*


*Description:* Information about and images of horse breeds from all over the world, arranged alphabetically.
Online: http://www.extension.org/horses  
Description: Search a database or ask a question about horses and receive a science-based, peer reviewed answer.

Online: http://www.myhorse matters.com/  
Description: Information on horse health. Also provides a calendar of upcoming educational opportunities.

Online: http://www.cvmbs.colostate.edu/ivapm/animals/horses.htm  
Description: Lists signs that indicate pain or discomfort in horses. A brief discussion of causes and list of treatments are given.

TheHorse.com.  
Online: http://www.thehorse.com/  
Description: A monthly newsletter that focuses on horse health and welfare news. Registration is required to access the articles.

Online: http://www.avma.org/onlnews/javma/feb00/s020100a.asp  
Description: This 2000 article published in the *Journal of the American Veterinary Medical Association* provides an overview of equine welfare issues.