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Information Resources on Spaying and Neutering Dogs, Cats and Related Wildlife

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Information Resources on Spaying and Neutering Dogs, Cats and Related Wildlife

AWIC Resource Series No. 28

January 2009

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The Animal Welfare Information Center (AWIC) is part of the National Agricultural Library, which is located in Beltsville, Maryland. Established in 1986 as mandated by amendments to the Animal Welfare Act, AWIC provides information for improved animal care and use in research, teaching, and testing.

About this Document

This publication updates and revises “Information Resources on Spaying and Neutering Cats, Dogs and Related Wildlife,” AWIC Resource Series No. 28 - January 2005.

This resource contains literature citations related to spaying and neutering pets. In addition to traditional surgical methods, there is information on oral contraceptives for pets, chemical sterilization options, and the development of a contraceptive vaccine using porcine zona pellucidae. Papers on methods of contraception and sterilization for exotic carnivores (such as wolves, foxes, and big cats) to control the timing of reproduction in zoos and to curb burgeoning populations of pest species in the wild are also included.

A chapter on teaching spaying and neutering in veterinary schools provides citations about non-animal alternatives as well as refinements to the current methods of instruction. It is hoped that this resource will be helpful to researchers, animal managers, shelter officials, veterinarians, teachers, and students. It also provides additional sources of information to pet owners about the impact of spaying or neutering on their own pet's physiological and behavioral health.

This publication is divided into 14 sections. The first 12 sections are comprehensive bibliographies containing citations about subjects related to the spaying and neutering of dogs, cats and related wildlife. Section 13 lists audiovisuals relating to spaying and neutering that may be particularly helpful in educational settings. Section 14 is a list of website resources, current as of December 2008.

For this document, the compiler searched for citations from multiple sources published between the years 1955 to 2008. The sources of information include peer-reviewed journals, conference proceedings, theses, annual reports, dissertations, books, monographs, and reviews. Some URLs are provided for documents available as eDocuments. 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 December 2008.

Information on how to request materials that are included in the collection of the National Agricultural Library (NAL) may be found on the Request Library Materials page. Please read carefully as there are certain restrictions on media and document types. All patrons are encouraged to explore local library resources first before contacting the National Agricultural Library.

Acknowledgements

The author wishes to acknowledge Sandra Ball for the Web publishing of this document. Her support is greatly appreciated.

General

- Anonymous (2001). **Castration -- statement from the Council for ethics.** *Norsk Veterinaertidsskrift* 113(10): 634-637. ISSN: 0029-2773.
NAL Call Number: 41.8 N81
Descriptors: animal behavior, animal welfare, castration, legislation, pets, professional ethics.
- Anonymous (1989). **Dog and cat reproduction, contraception and artificial insemination: Proceedings of the First International Symposium on Canine and Feline Reproduction. Dublin, Ireland, July 1-2, 1988.** *Journal of Reproduction and Fertility Supplement* 39: 1-323. ISSN: 0449-3087.
NAL Call Number: 442.8 J8222 Suppl.
Descriptors: animals, cat physiology, dog physiology, female, pregnancy, physiology of reproduction.
- Anonymous (1990). **Methods of spaying.** *The Veterinary Record* 127(10): 267. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: animals, cats, dogs, female, hysterectomy, ovariectomy, veterinary surgery.
- Anonymous (1995). **Spaying the female cat.** *Feline Practice* 23(1): 29-32. ISSN: 1057-6614.
NAL Call Number: SF985.F4
Descriptors: cats, ovariectomy, hysterectomy, pathogenesis, carnivora, felidae, gonadectomy, mammals, sterilization, surgical operations, complications, recovery
- Alexander, S. and S. Shane (1994). **Characteristics of animals adopted from an animal control center whose owners complied with a spaying/neutering program.** *Journal of the American Veterinary Medical Association* 205: 472-476. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: cats, dogs, ownership, pet adoption, castration, ovariectomy, sex, age characteristics.
- The Alliance for Contraception in Cats and Dogs (2002). **International Symposium on Nonsurgical Methods for Pet Population Control, Callaway Gardens, Pine Mountain, GA**, 127 p.
Online: <http://www.vetmed.vt.edu/ACCD/2002proc.pdf>
Descriptors: pet overpopulation, population control strategies, contraceptive vaccines, contraceptive drugs, dogs, cats.
- An, M.Y., D. Fau, and I.H. Jang (1998). **Three different operations in cryptorchid dogs.** *Korean Journal of Veterinary Clinical Medicine* 15(2): 303-306. ISSN: 1225-4800.
Descriptors: cryptorchidism, testes, reproductive disorders, castration, testicular diseases, surgery, male genitalia, dogs.

- Andersson A (2001). **Castration and progestagen treatment of male dogs, part 1.** *Svensk Veterinartidning* 53(7): 385-389. ISSN: 0346-2250.
NAL Call Number: 41.9 SV23
Descriptors: adenoma, adverse effects, aggression, aggressive behavior, castration, hernia, neoplasms, progestogens, reproductive disorders, reviews, sex hormones, sexual dimorphism, skin diseases, treatment.
- Andersson A (2001). **Castration and progestagen treatment of male dogs, part 2.** *Svensk Veterinartidning* 53(7): 391-397. ISSN: 0346-2250.
NAL Call Number: 41.9 SV23
Descriptors: aggressive behavior, castration, male animals, medroxyprogesterone, potency, prostate.
- Andersson A and Linde Forsberg C (2002). **Castration and progestagen treatment of male dogs, Part 1.** *The European Journal of Companion Animal Practice* 12(2): 173-177.
NAL Call Number: SF981.E8
Descriptors: activity, adenoma, adverse effects, aggression, animal behavior, appetite, castration, clinical aspects, cryptorchidism, epilepsy, hernia, hyperplasia, live weight, neoplasms, progestogens, sex hormones, skin diseases, testes, therapy, urinary incontinence.
- Andersson A and Linde Forsberg C (2002). **Castration and progestagen treatment of male dogs, Part 2.** *The European Journal of Companion Animal Practice* 12(2): 178-185.
NAL Call Number: SF981.E8
Descriptors: adverse effects, animal behavior, castration, clinical aspects, medroxyprogesterone, progestogens, sex hormones, therapy, urination.
- Aranez, J.B. (1955). **Preliminary observations on a new orchietomy technique for cats.** *Journal of the American Veterinary Medical Association* 126(939): 457-458. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: orchietomy technique, inhalation anesthetics, cats, scrotal incision, spermatic artery, noncrushing forceps, surgeons knots, spermatic cords.
- Arnold, S., M. Hubler, M. Casal, G. Lott Stolz, B. Hauser, and P. Rusch (1988). **Transplantation von autologem Ovargewebe zur Verhinderung von unerwünschten Kastrationsfolgen bei der Hundin (Überprüfung von Patienten mehrere Jahre nach der Operation). [Transplantation of autologous ovarian tissue to prevent side effects of spaying in bitches (survey of cases several years after the operation)].** *Schweizer Archiv Fur Tierheilkunde* 130(7): 369-379. ISSN: 0036-7281.
NAL Call Number: 41.8 SCH9
Descriptors: allografts, ovaries, transplantation, complications, dogs.
Language of Text: German; Summary in English, French and Italian.
- Attia, K.A., A.A. Zaki, B.E. Eilts, D.L. Paccamonti, G. Hosgood, M.A. Dietrich, D.W. Horohov, and D.C. Blouin (2000). **Anti-sperm antibodies and seminal characteristics after testicular biopsy or epididymal aspiration in dogs.** *Theriogenology* 53(6): 1355-1363. ISSN: 0093-

691X.

NAL Call Number: QP251.A1T5

Descriptors: dogs, testes, biopsy, antibody formation, antibodies, fine needle aspiration, epididymis, castration, spermatozoa, motility, abnormalities, morphology.

Baarschers, J.J., U.E. Hommes, and P.H.A. Poll (1976). **Hemoclip-tang. [The use of hemoclips].** *Tijdschrift Voor Diergeneeskunde* 101(10): 558-559. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: castration instrumentation, surgical staplers, bitches, uterus, ovariectomy, cats, dogs.

Language of Text: Dutch.

Backus, R., M. Kanchuk, and Q. Rogers (2003). **Cholecystokinin (CCK) release as indicated by plasma CCK concentrations is increased by gonadectomy in male cats.** *FASEB Journal* 17(4-5): Abstract No. 523-2. ISSN: 0892-6638.

NAL Call Number: QH301.F3

Descriptors: gonadectomy techniques, therapeutic and prophylactic techniques, computer techniques, cats.

Baumans, V., G. Dijkstra, and C.J. Wensing (1982). **The effect of orchidectomy on gubernacular outgrowth and regression in the dog.** *International Journal of Andrology* 5(4): 387-400. ISSN: 0105-6263.

NAL Call Number: QP251.I55

Abstract: To test whether the outgrowth and regression of the gubernaculum testis and consequently testicular descent are testis dependent, unilateral and bilateral orchidectomies were performed on foetal dogs at 49 days post coitum (p.c.), and on newborns at day 0 and day 3 after birth. Prior to these experiments the vascularisation of the testis, epididymis and gubernaculum had been studied to develop a method of orchidectomy, in which the vascularisation of the gubernaculum and epididymis was minimally damaged. After bilateral orchidectomy at 49 days p.c., outgrowth of the gubernaculum stopped completely, and the epididymis remained in its original abdominal position. After bilateral orchidectomy at birth, the descent of the remaining epididymis from an intra-abdominal to an extra-abdominal position was retarded, due to retarded regression of the gubernaculum. Bilateral orchidectomy 3 days after birth resulted in a slightly retarded gubernacular regression. After unilateral orchidectomies the effects were similar but less pronounced. It was concluded that the testis induces and maintains the outgrowth and initiates regression of the gubernaculum, thereby regulating the process of testicular descent. However, once the regression had started, it appeared to proceed more or less autonomously.

Descriptors: castration, cell division, dogs, epididymis, male genitalia, organ weight, pregnancy, testis.

- Belfield, W.O. (1972). **For a more normal life for a pet: partial spay (hysterectomy)**. *Veterinary Medicine: Small Animal Clinician* 67(11): 1223-1224. ISSN: 0042-4889.
NAL Call Number: 41.8 M69
Descriptors: animals, dogs, female, hysterectomy, sterilization.
- Blake, J.A. (1969). **A technique for castrating cats**. *Journal of the American Veterinary Medical Association* 154(1): 25. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: animals, castration, cats, male, methods.
- Bloomberg, M.S. (1996). **Surgical neutering and nonsurgical alternatives**. *Journal of the American Veterinary Medical Association* 208(4): 517-519. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: age factors, animals, methods of castration, cats, population density.
- Boothe, H.W. (2000). **Surgery of the testes and scrotum**. In: Birchard SJ and Sherding RG (editors), *Saunders Manual of Small Animal Practice*, 2nd edition, W.B. Saunders: Philadelphia, p. 1005-1008. ISBN: 0-7216-7078-4.
NAL Call Number: SF981.S29 2000
Descriptors: surgery, treatment, testicular diseases, scrotum, postoperative care, postoperative complications, castration, ablation.
- Bronson, R.T. (1981). **Age at death of necropsied intact and neutered cats**. *American Journal of Veterinary Research* 42(9): 1606-1608. ISSN: 0002-9645.
NAL Call Number: 41.8 Am3A
Descriptors: castration, cats, hysterectomy, age of death.
- Bronson, R.T. (1982). **Variation in age at death of dogs of different sexes and breeds**. *American Journal of Veterinary Research* 43(11): 2057-2059. ISSN: 0002-9645.
NAL Call Number: 41.8 Am3A
Abstract: A retrospective study of necropsy data for 2,002 dogs showed that the mean age at death of neutered dogs of both sexes exceeded that of intact dogs, but the differences were not significant. A wide variation in mean age at death of 56 breeds and cross breeds, 3.0 to 9.9 years, was found. This variation was not correlated with mean breed body weight. An attempt was made to explain the variability by finding diseases to which dogs of the short-lived breeds were particularly susceptible. This was not possible in general, since the samples of each breed were small and the total number of diseases from which they died so large. Dogs of long-lived breeds died of diseases appropriate to their age, particularly cancer, 39% of the sample. In the sample as a whole, cancer accounted for 20% of deaths at 5 years and increased to and remained between 40% and 50% from 10 to 16 years of age.
Descriptors: dog diseases mortality, age factors, castration veterinary, crosses, genetic, dogs, longevity, retrospective studies, sex factors, species specificity.

- Brown, J.W. (1990). **Methods of spaying.** *The Veterinary Record* 127(16): 411. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: abscess, cats, female, adverse effects of hysterectomy, uterine disease.
- Brueschke, E.E., M. Burns, J.H. Maness, J.R. Wingfield, K. Mayerhofer, and L.J. Zaneveld (1974).
Development of a reversible vas deferens occlusive device. I. Anatomical size of the human and dog vas deferens. *Fertility and Sterility* 25(8): 659-672. ISSN: 0015-0282.
NAL Call Number: 448.8 F41
Descriptors: comparative anatomy, contraceptive devices, dogs, human, male, vas deferens.
- Brueschke, E.E., R.A. Kaleckas, J.R. Wingfield, T.J. Welsh, and L.J. Zaneveld (1980). **Development of a reversible vas deferens occlusion device. VII. Physical and microscopic observations after long-term implantation of flexible prosthetic devices.** *Fertility and Sterility* 33(2): 167-178. ISSN: 0015-0282.
NAL Call Number: 448.8 F41
Abstract: Flexible prosthetic devices developed previously to reversibly block sperm transport through the vas deferens were implanted in the vasa deferentia of dogs or kept in a semen bath for a 6-month period. Dimensional measurements, flow characteristics, leakage tests, and detent action force tests to displace the valve stem were performed with the valves. No changes occurred in any of these parameters with the exception of a decrease in the force required to change the position of the valve stem. This explains the occasional passage of spermatozoa through certain closed devices after they have been implanted for long periods of time. Histologic studies indicated that the same types of genital tract changes are associated with an implanted device as with vasectomy, and that they occur with approximately equal frequencies. Scanning electron microscope studies showed (1) excellent tissue ingrowth into the Dacron velour material of the implanted device; (2) the build-up of material, consisting in part of spermatozoa, in the device lumen and on the valve stem; and (3) the absence of surface degradation of either the Silastic material or the valve stem of the device. It is concluded that no irreversible tissue damage is caused by the long-term implantation of flexible prosthetic devices into the vas deferens.
Descriptors: male contraceptive devices, dogs, sperm transport block, vas deferens, epididymis, prostheses and implants.
- Brueschke, E.E., J.R. Wingfield, M. Burns, and J.D. Zaneveld (1974). **Development of a reversible vas deferens occlusive device. II. Effect of bilateral and unilateral vasectomy on semen characteristics in the dog.** *Fertility and Sterility* 25(8): 673-686. ISSN: 0015-0282.
NAL Call Number: 448.8 F41
Descriptors: cell count, contraceptive devices, dogs, hydrogen ion concentration, male, methods, semen, spermatozoa, vasectomy.
- Brueschke, E.E., L.J. Zaneveld, R. Rodzen, and D. Berns (1974). **Development of a reversible vas deferens occlusive device. III. Morphology of the human and dog vas deferens: a study with the scanning electron microscope.** *Fertility and Sterility* 25(8): 687-702. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Descriptors: comparative anatomy, contraceptive devices for dogs, electron microscopy, vas deferens, vasectomy.

Brueschke, E.E., L.J. Zaneveld, R. Rodzen, K. Mayerhoffer, M. Burns, and J.R. Wingfield (1975).

Development of reversible vas deferens occlusive device: V. Flexible prosthetic devices.

Fertility and Sterility 26(1): 40-52. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Abstract: In contrast to the results with rigid-ended prosthetic devices implanted in the vas deferens of the dog, effective sperm transport was obtained for prolonged periods of time with flexible-ended (all soft) devices. Such transport could be halted by device occlusion with clips or shuttle stem valves. Opening the devices resulted once again in the passage of spermatozoa, indicating that these devices may be potentially useful as reversible male contraceptives. More research is necessary to determine the cause of an overall decrease in sperm output after device implantations and to evaluate any adverse side effects of such devices. Dacron velour-covered suture rings on the devices permitted effective tissue ingrowth and prevented leakage or recanalization.

Descriptors: cell movement, dogs, male, prostheses and implants, silicone elastomers, spermatozoa, stainless steel, vas deferens, vasectomy.

Burke, T.J. (1977). **Fertility control in the cat.** *The Veterinary Clinics of North America* 7(4): 699-703. ISSN: 0091-0279.

NAL Call Number: SF601.V523

Descriptors: cats, castration, contraception, estrus, hysterectomy, megestrol, nandrolone, vasectomy, endometritis.

Charpin, C., T.M. Zielonka, D. Charpin, J.L. Ansaldi, C. Allasia, and D. Vervloet (1994). **Effects of castration and testosterone on Fel dI production by sebaceous glands of male cats: II-morphometric assessment.** *Clinical and Experimental Allergy* 24(12): 1174-1178. ISSN: 0954-7894.

Descriptors: cats, allergens, Fel d I antigen, sebaceous gland, males, cats.

Chatham, K.N. (1975). **A buried suture pattern for ovariohysterectomies and cesarean operations (a photographic essay).** *Veterinary Medicine: Small Animal Clinician* 70(1): 82-85. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: animals, castration, cats, cesarean section, dogs, female, hysterectomy, suture technique, sutures.

Chaumont, A.J. and J. Mehl (1972). **Emasculat[i]on par un chien [Emasculat[i]on by a dog].** *Médecine Légale Et Dommage Corporel* 5(2): 154. ISSN: 0025-679X.

Descriptors: bites and stings, adult, cadaver, castration, dogs, forensic medicine, gastrointestinal hemorrhage mortality.

Language of Text: French.

- Chawla, S.K. and J.F. Reece (2002). **Timing of oestrus and reproductive behaviour in Indian street dogs.** *The Veterinary Record* 150(14): 450-451. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: prevention and control of dog diseases, ovariectomy, India, population control, rabies, seasons, sexual behavior, vaccination, females, dogs.
- Concannon, P.W. and V.N. Meyers-Wallen (1991). **Current and proposed methods for contraception and termination of pregnancy in dogs and cats.** *Journal of the American Veterinary Medical Association* 198(7): 1214-1225. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: induced abortion, cats, methods of contraception, dogs, embryo implantation, megestrol acetate.
- Cowan, L.A., J.A. Barsanti, J. Brown, and A. Jain (1991). **Effects of bacterial infection and castration on prostatic tissue zinc concentration in dogs.** *American Journal of Veterinary Research* 52(8): 1262-1264. ISSN: 0002-9645.
NAL Call Number: 41.8 Am3A
Descriptors: prostatitis, castration, zinc, animal models, dogs, body fluids, *Escherichia coli*.
- Cowan, L.A., J.A. Barsanti, W. Crowell, and J. Brown (1991). **Effects of castration on chronic bacterial prostatitis in dogs.** *Journal of the American Veterinary Medical Association* 199(3): 346-350. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: dogs, castration, prostatitis, *Escherichia coli*, chronic infection.
- Crane, S.W. (1990). **Orchiectomy of descended and retained testes in the dog and cat.** In: M.J. Bojrab, S.J. Birchard and J.L. Tomlinson Jr. (editors), *Current Techniques in Small Animal Surgery*, 3rd edition, Lea and Febiger: Philadelphia, PA, USA, p. 416-422. ISBN: 0812111931.
NAL Call Number: SF991.C87 1990
Descriptors: male genitalia, veterinary surgery, cats, dogs, orchitis, hernia, castration, cryptorchidism.
- Crane, S.W., J.E. Smallwood and C.J.G. Wensing (1983). **Orchiectomy of descended and retained testes in the dog and cat and biopsy of the testis [Castration].** In: M.J. Bojrab, S.W. Crane and S.P. Arnoczky (Editors), *Current Techniques in Small Animal Surgery, 2nd edition*, Lea & Febiger: Philadelphia, PA, p. 369-379. ISBN: 0812108620.
NAL Call Number: SF991.C87 1983
Descriptors: male genitalia, veterinary surgery, cats, dogs, orchitis, hernia, castration, cryptorchidism.
- Csiszar, P. and E. Brath (1997). **Minimally invasive laparoscopic surgery on experimental animal models.** *Acta Chirurgica Hungarica* 36(1-4): 63-64. ISSN: 0231-4614.
Abstract: Our goal was to find a very good model for gynecological laparoscopic operations. The main purpose of the operations was to perform the same types of laparoscopic opera-

tions as we use daily in our clinical practice at the Department of Obstetrics and Gynecology. UMMSD. The uterus of female dogs seemed to be ideal for this work. In every experiment we carried out 10 different interventions on identical part of different dog uterus. The operations were performed at identical time period of day (a.m.). The weight of the female dogs were similar. The anaesthesia was also performed the same way in every case. The main purpose of the operations was to find some significant changes or differences between the 10 different surgical techniques. The histological investigation were carried out with normal microscope and electron microscope.

Descriptors: gynecological laparoscopy, sterilization, surgical procedures, animal models, comparison study, tubal sterilization.

Davidson, D.L. (1998). **Cat castrations and veterinary nurses.** *The Veterinary Record* 142(15): 406-407. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: animal technicians, animals, methods of castration, methods, standards, veterinary, cats, professional competence, veterinary medicine.

Deen, A., Y. Jongsma-Biben, and R. van Gisbergen (2003). **Honden castreren in het buitenland [Dog castration abroad].** *Tijdschrift Voor Diergeneeskunde* 128(3): 92. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: dogs, economics and methods of castration, female.

Language of Text: Dutch.

Dejneka, G.J. and W. Nizanski (2000). **Wskazania do owariohisterektomii u suk [Indications for ovariectomy in bitches].** *Zycie Weterynaryjne* 75(9): 473-478. ISSN: 0137-6810.

Descriptors: contraceptives, bitch, dogs, hysterectomy, ovariectomy, pyometra.

Language of Text: Polish.

Dejneka GJ and Nizanski W (2000). **Uwagi na temat kastrowania psów i kotów. [Castration in dogs and cats].** *Magazyn Weterynaryjny* 9(50): 17-19. ISSN: 1230-4425 .

Descriptors: castration, companion animals, surgical techniques.

Language of Text: Polish.

Dorn, A.S. (1975). **Ovariectomy by the flank approach.** *Veterinary Medicine: Small Animal Clinician* 70(5): 569-573. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: animals, methods of castration, cats, female, hysterectomy.

Dorn, A.S., D.L. Bone, and J.R. Bellah (1985). **Sex hormone-related diseases treated surgically in male dogs.** *Modern Veterinary Practice* 66(10): 727-733. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: sex differentiation disorders, endocrine diseases, castration, male genital diseases, veterinary surgery, neoplasms, dogs.

Erdem, H. (2002). **Kopeklerde ovariohysterectomy: en fazla sorulan sorular. [Ovariohysterectomy in bitches: the most frequently asked questions]**. *Hayvancilik Arastirma Dergisi* 12(1): 67-70. ISSN: 1300-2031.

Descriptors: bitches, female genital diseases, hysterectomy, mammary gland diseases, ovariectomy, postoperative complications, reproductive disorders, reviews, surgery, surgical operations, dogs.

Fahim, M.S., Z. Fahim, J. Harman, I. Thompson, J. Montie, and D.G. Hall (1977). **Ultrasound as a new method of male contraception**. *Fertility and Sterility* 28(8): 823-831. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Abstract: Twenty male cats were treated once or twice with 1 watt/sq cm of ultrasound for 10 minutes. Each of 24 male dogs received one to three treatments with 1 watt/sq cm for 10 minutes. Another six dogs were treated with 2 watts/sq cm for 15 minutes. Four Cebus apella monkeys were treated with the same dosage as that used for the cats and dogs. A dosage of 1 watt/sq cm for 10 minutes was also applied to four human patients without the use of anesthetics, and no pain or side effects were noted. In all treated animals as well as in human patients the results indicate that ultrasound significantly suppresses spermatogenesis according to the dosage and frequency of treatment, without any effect on Leydig cells or blood testosterone levels.

Descriptors: cats, methods of contraception, dogs, Haplorhini, cebus monkeys, rats, seminiferous tubules, spermatogenesis, temperature, ultrasonics.

Fayrer Hosken R. (2003). **Contraceptive techniques for male dogs and cats**. In: Root Kustritz M.V. (editor), *Small Animal Theriogenology*, Butterworth Heinemann: St. Louis, p. 447-456. ISBN: 0-7506-7408-3.

Descriptors: castration, contraceptives, epididymis, GnRH, males, estrogens, progestogens, reproduction, veterinary surgery, testes, vasectomy.

Fettman, M.J., C.A. Stanton, L.L. Banks, D.W. Hamar, D.E. Johnson, R.L. Hegstad, and S. Johnson (1997). **Effects of neutering on bodyweight, metabolic rate and glucose tolerance of domestic cats**. *Research in Veterinary Science* 62(2): 131-136. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: Few controlled studies have been made of the possible mechanisms and physiological consequences of weight gain after cats have been neutered. In this study, six male and six female cats were gonadectomised and compared with five entire male and six entire female cats, before they were neutered and one and three months later. The neutered males gained significantly more weight (mean [SEM] per cent) than the entire males (30.2 [5.2] v 11.8 [2.3]) and the entire females gained 40.0 (7.3) v 16.1 (3.3) per cent, (P<0.05). The castrated males gained more weight as fat than the sexually intact males (22.0 [3.3] v 8.8 [4.5] per cent, P<0.05). There was a significant increase (P<0.05) in daily food intake after neutering. Spayed females underwent a significant decrease in fasting metabolic rate (83.7 [5.5] v 67.2 [2.3] kcal/kg bodyweight 0.75/day P<0.05). Gonadectomy had minimal effects on serum thyroid hormone concentrations, the resting or fasting metabolic rates in males, or on indices of glucose tolerance.

Descriptors: cats, castration, ovariectomy, bodyweight, metabolism, glucose tolerance, sex differences, food intake, digestibility, body composition, triacylglycerols, cholesterol, insulin.

Fingland, R.B. (1990). **Ovariohysterectomy.** In: M.J. Bojrab (editor), *Current Techniques in Small Animal Surgery*, 3rd edition, Lea and Febiger: Philadelphia, PA, p. 398-404. ISBN: 0-8121-1193-1.

Descriptors: female genitalia, sterilization, surgical operations, postoperative complications, endocrine diseases, urinary incontinence, body weight, uterine diseases, ovarian diseases, mammary gland diseases, bitches, ovariectomy, hysterectomy, surgery, dogs, cats.

Fingland, R.B. (2000). **Surgery of the ovaries and uterus.** In: Birchard S.J. and Sherding R.G. (editors), *Saunders Manual of Small Animal Practice*, 2nd edition, W.B. Saunders: Philadelphia, PA. ISBN: 0-7216-7078-4.

NAL Call Number: SF981.S29 2000

Descriptors: ovariohysterectomy, anatomy, surgical procedure, cesarean section, postoperative complications, uterine prolapse.

Flynn, M.F., E.M. Hardie, and P.J. Armstrong (1996). **Effect of ovariohysterectomy on maintenance energy requirement in cats.** *Journal of the American Veterinary Medical Association* 209(9): 1572-1581. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, ovariectomized females, ovariectomy, hysterectomy, energy requirements, prediction, body condition, weight control, caloric intake, food intake.

Fukuda, S. and H. Iida (2000). **Effects of orchidectomy on bone metabolism in beagle dogs.** *The Journal of Veterinary Medical Science* 62(1): 69-73. ISSN: 0916-7250.

NAL Call Number: SF604.J342

Abstract: The effects of orchidectomy on bone metabolism in male beagle dogs were examined using twelve 2-year-old dogs that were orchidectomized. The dogs' bilateral iliac bones, double-labeled with tetracycline and calcein for the histomorphometry, were obtained from three dogs prior to orchidectomy and at 3, 6, 9, and 12 months afterwards. The serum biochemical constituents related to bone metabolism were examined before and every month after orchidectomy. Between 1 and 6 months after orchidectomy, the value of serum testosterone decreased (1 month), while the levels of parathyroid hormone, calcitonin, total calcium, osteocalcin, and alkaline phosphatase activity increased significantly, indicating a high bone turnover. The mean trabecular thickness and the fraction of labeled osteoid surface decreased significantly 3 months after orchidectomy, but other histomorphometric parameters were unchanged. In the period 7-12 months after orchidectomy, the parathyroid hormone level increased ever and above that of the first 6-month period, while the levels of calcitonin, osteocalcin, alkaline phosphatase activity, and phosphorus decreased. The bone volume, mean trabecular thickness, and the fraction of labeled trabecular surface decreased significantly compared with the pre-orchidectomy values. These findings indicate an imbalance in bone metabolism (i.e. bone resorption > bone formation). These results indicate that a loss of bone volume accompanied the fall in sex hormone levels following orchidectomy and suggest that the orchidectomized dog is available as an animal model for studying osteo-

porosis caused by hypogonadism and the decline of sex functions in men.

Descriptors: animal model, bone remodeling, effects of orchietomy, testosterone, bone volume, sex hormones.

Gerber, H.A., W. Jochle, and F.G. Sulman (1973). **Control of reproduction and of undesirable social and sexual behaviour in dogs and cats.** *The Journal of Small Animal Practice* 14(3): 151-158. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: animal behavior, cats, contraceptive agents, dogs, estrus, hydroxysteroids, pregnatrienes, progestins, reproduction, sexual behavior, social behavior.

Ghanawat, H.G. and M.B. Mantri (1996). **Comparative study of various approaches for ovari-hysterectomy in cats.** *Indian Veterinary Journal* 73(9): 987-988. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: cat diseases, surgery, techniques, ovariectomy, hysterectomy, cats.

Gobello, C., H. Baschar, G. Castex, R.L. de la Sota, and R.G. Goya (2001). **Dioestrous ovariectomy: a model to study the role of progesterone in the onset of canine pseudopregnancy.** *Journal of Reproduction and Fertility Supplement* 57: 55-60. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: It has been suggested that overt pseudopregnancy in bitches is caused by an increase in the concentration of serum prolactin as a result of an abrupt decrease in progesterone concentration in the late luteal phase. This hypothesis was tested by using ovariectomy at dioestrus as an experimental model. A total of 18 intact cross- and purebred bitches were used. Eleven animals were ovariectomized (day 0) between day 25 and day 40 of the oestrous cycle, and seven intact bitches were used as controls. Blood samples for determination of prolactin and progesterone concentrations were collected on days -1, 1, 2, 3 and 7 in the ovariectomized group, and on day 1 and day 7 in the control group. On day 7, the presence or absence of overt pseudopregnancy was recorded. The four ovariectomized bitches with a history of pseudopregnancy showed signs of overt pseudopregnancy ($P < 0.01$). On day 7, progesterone concentrations were significantly higher in the control than in the ovariectomized bitches ($P < 0.01$). The expected decrease in serum progesterone concentration after ovariectomy was similar in pseudopregnant bitches and non-pseudopregnant bitches. However, in pseudopregnant bitches, but not in non-pseudopregnant bitches, there was a marked increase (expressed as percentage change) in the concentration of prolactin between day -1 and day 7 ($P < 0.01$). It was concluded that the abrupt decrease in progesterone concentrations does not lead systematically to pseudopregnancy. Only in bitches predisposed to pseudopregnancy would an abrupt decrease in progesterone concentrations induce a substantial increase in prolactin concentrations, which in turn would trigger the typical signs of pseudopregnancy.

Descriptors: dogs, female, animal models, ovariectomy, progesterone, prolactin, pseudopregnancy.

- Gobello, C. and Y. Corrada (2002). **Noninfectious prostatic diseases in dogs.** *Compendium on Continuing Education for the Practicing Veterinarian* 24(2): 99-108. ISSN: 0193-1903.
NAL Call Number: SF601.C66
Descriptors: dogs, prostate, hyperplasia, clinical aspects, castration, treatment, testosterone, hormone antagonists, diethylstilbestrol, progestogens, cysts, metaplasia, neoplasms.
- Gourley, J. (1997). **When to spay dogs and cats.** *The Veterinary Record* 140(4): 104. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: age, animals, methods of castration, cats, dogs, sex maturation, prepubertal gonadectomy.
- Gregory, S.P., P.E. Holt, T.J. Parkinson, and C.M. Wathes (1999). **Vaginal position and length in the bitch: relationship to spaying and urinary incontinence.** *The Journal of Small Animal Practice* 40(4): 180-184. ISSN: 0022-4510.
NAL Call Number: 41.8 J8292
Descriptors: bitches, vagina, position, length, ovariectomy, urinary incontinence, pressure, bodyweight.
- Hamilton, J.B., R.S. Hamilton, and G.E. Mestler (1969). **Duration of life and causes of death in domestic cats: influence of sex, gonadectomy, and inbreeding.** *Journal of Gerontology* 24(4): 427-437. ISSN: 0022-1422.
Descriptors: animals, domestic, castration, cats, inbreeding, mortality, sex factors, age factors.
- Hansen, B.D., E.M. Hardie, and G.S. Carroll (1997). **Physiological measurements after ovariohysterectomy in dogs: what's normal?** *Applied Animal Behaviour Science* 51(1-2): 101-109. ISSN: 0168-1591.
NAL Call Number: QL750.A6
Descriptors: ovariohysterectomy, pain, surgery, dogs, oxymorphone, cortisol, stress.
- Harper E.J., Stack D.M., Watson T.D.G., and Moxham G. (2001). **Effects of feeding regimens on bodyweight, composition and condition score in cats following ovariohysterectomy.** *The Journal of Small Animal Practice* 42(9): 433-438. ISSN: 0022-4510.
NAL Call Number: 41.8 J8292
Descriptors: animal feeding, body composition, body fat, live weight, ovariectomy, veterinary surgery, cats.
- Hartmann S (2000). *Einfluss des Alters und des Hodenstatus auf periphere Blutkonzentrationen von Thyroxin, Thyreotropin, Cortisol, Luteinisierungshormon, Testosteron und Oestradiol 17beta bei adulten Belgischen und Deutschen Schaferhunden. [Influence of age and gonadal status on peripheral blood concentrations of thyroxine, thyrotropin, cortisol, testosterone, luteinizing hormone and oestradiol-17beta in adult Belgian and German shepherd dogs]*. Dissertation, Tierärztliche Hochschule Hannover: Hannover, Germany. 97 p.

Descriptors: dissertation, age differences, castration, cryptorchidism, estradiol, LH, testosterone, thyrotropin, thyroxine.

Language of Text: German.

Hawthorne, L. (2002). **Hawthorne's rebuttal.** *Journal of Applied Animal Welfare Science* 5(3): 243-246. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: genetics, philosophy and ethics, reproduction, cloning genetic techniques, laboratory techniques, embryo assessment, spaying, overpopulation.

Hellebrekers, L.J. and N. Reens (1993). **Castreren van katers. [Castration of male cats].** *Tijdschrift Voor Diergeneeskunde* 118(9): 314-315. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: anesthesia, castration, cats, adverse effects of anesthesia, myocardium metabolism, oxygen consumption, drug effects.

Language of Text: Dutch.

Herron, M.A. and M.R. Herron (1972). **Vasectomy in the cat.** *Modern Veterinary Practice* 53(6): 41-43. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: cats, male, spermatic cord, sterilization, surgery of the vas deferens.

Hesta A, Debraekeleer J, Janssens G, Wilde R de, and de Wilde R (2000). **The importance of diet adaptations after the sterilization and castration of the cat.** *Vlaams Diergeneeskundig Tijdschrift* 69(3): 175-180. ISSN: 0303-9021.

NAL Call Number: 41.8 V84

Descriptors: castration, sterilization, pets, animalfeeding, hyperphagia, obesity.

Hoening, M. and D.C. Ferguson (2002). **Effects of neutering on hormonal concentrations and energy requirements in male and female cats.** *American Journal of Veterinary Research* 63(5): 634-639. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: cats, gonadectomy, male animals, female animals, hormones, fatty acids, obesity, diabetes, energy requirements, glucose, sex differences, insulin, thyroxine.

Houlton, J. and N. McGlennon (1992). **Castration and physcal closure in the cat.** *The Veterinary Record* 131(20): 466-467. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: cats, castration, bone, bone mineralization, delayed physcal closure, pilot study.

Howe, L.M., M.R. Slater, H.W. Boothe, H.P. Hobson, T.W. Fossum, A.C. Spann, and W.S. Wilkie (2000). **Long-term outcome of gonadectomy performed at an early age or traditional age in cats.** *Journal of the American Veterinary Medical Association* 217(11): 1661-1665. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine long-term results and complications of gonadectomy performed at an early age (prepubertal) or at the traditional age in cats. DESIGN: Cohort study. ANIMALS: 263 cats from animal shelters. PROCEDURE: Cats that underwent gonadectomy were allotted to 2 groups on the basis of estimated age at surgery (traditional age, > or = 24 weeks old; prepubertal, < 24 weeks old). Adoptive owner information was obtained from shelter records, and telephone interviews were conducted with owners to determine physical or behavioral problems observed in the cats after adoption. Follow-up information was obtained from attending veterinarians for cats with complex problems or when owners were uncertain regarding the exact nature of their cat's problem. RESULTS: Compared with traditional-age gonadectomy, prepubertal gonadectomy did not result in an increased incidence of infectious disease, behavioral problems, or problems associated with any body system during a median follow-up period of 37 months. Additionally, the rate of retention in the original adoptive household was the same for cats that underwent prepubertal gonadectomy as those that underwent traditional-age gonadectomy. CONCLUSIONS AND CLINICAL RELEVANCE: Prepubertal gonadectomy may be performed safely in cats without concern for increased incidence of physical or behavioral problems for at least a 3-year period after gonadectomy.

Descriptors: prepubertal gonadectomy, cats, animal welfare, animal behavior, age factors, follow-up studies.

Howe, L.M., M.R. Slater, H.W. Boothe, H.P. Hobson, J.L. Holcom, and A.C. Spann (2001). **Long-term outcome of gonadectomy performed at an early age or traditional age in dogs.** *Journal of the American Veterinary Medical Association* 218(2): 217-221. ISSN: 0003-1488. **NAL Call Number:** 41.8 Am3

Abstract: OBJECTIVE: To determine long-term results and complications of gonadectomy performed at an early age (prepubertal) or at the traditional age in dogs. DESIGN: Cohort study. ANIMALS: 269 dogs from animal shelters. PROCEDURE: Dogs that underwent gonadectomy were allotted to 2 groups on the basis of estimated age at surgery (traditional age, > or =24 weeks old; prepubertal, < 24 weeks old). Adoptive owner information was obtained from shelter records, and telephone interviews were conducted with owners to determine physical or behavioral problems observed in the dogs since adoption. Follow-up information was obtained from attending veterinarians for dogs with complex problems or when owners were uncertain regarding the exact nature of their dog's problem. RESULTS: Prepubertal gonadectomy did not result in an increased incidence of behavioral problems or problems associated with any body system, compared with traditional-age gonadectomy, during a median follow-up period of 48 months after gonadectomy. Rate of retention in the original adoptive household was the same for dogs that underwent prepubertal gonadectomy as those that underwent traditional-age gonadectomy. Infectious diseases, however, were more common in dogs that underwent prepubertal gonadectomy. CONCLUSIONS AND CLINICAL IMPLICATIONS: With the exception of infectious diseases, prepubertal gonadectomy may be safely performed in dogs without concern for increased incidence of physical or behavioral problems during at least a 4-year period after gonadectomy.

Descriptors: animal behavior, early age gonadectomy, ovariectomy, orchietomy, prepubertal gonadectomy, dogs, animal shelter, questionnaires.

Hubbard, J.I., B.I. Hyland, and N.E. Sirett (1990). **Stimulation of the LH release by naloxone in anaesthetized cats after ovariectomy.** *Neuroscience Letters* 108(3): 295-302. ISSN: 0304-3940.

NAL Call Number: QP351.N3

Abstract: The effect of intravenous injections or infusions of the opioid receptor antagonist naloxone on the secretion of luteinizing hormone (LH) was studied in 18 spayed cats anaesthetized with Althesin. Effective injections significantly increased the LH concentration of plasma samples (taken every 10-15 min and measured by radio-immunoassay) to a peak 20-30 min after injection. The concentration thereafter declined exponentially ($k_e = 0.42$), and, in 4/8 trials rose again significantly and declined again without further injection. The threshold dose was between 0.4 and 0.5 mg/kg. There did not appear to be a dose dependence of the effect above threshold. Infusion of naloxone at levels up to 5 mg/kg/h was effective in producing a pulsatile release of LH and repeated injections of threshold doses (0.5 mg/kg) could produce a maintained plateau and pulsatile release at frequencies comparable to pulse frequencies in vivo.

Descriptors: anesthesia, animal, cats, dose-response relationship, female, luteinizing hormone, naloxone, ovariectomy.

Hummer, R.L. (1975). **Pets in today's society.** *American Journal Of Public Health* 65(10): 1095-1098. ISSN: 0090-0036.

NAL Call Number: 449.9 Am3J

Descriptors: domestic animals, cats, contraception, dogs, population growth, sterilization, zoonoses.

Jayaraman, K.S. (1991). **Sterilized dogs, bulls will keep their libido.** *Nature* 352(6331): 97. ISSN: 0028-0836.

NAL Call Number: 472 N21

Descriptors: cattle, dogs, India, male, reproductive sterilization, biological drive.

Jochle, W. (1975). **Hormones in canine gynecology. A review.** *Theriogenology* 3(4): 152-165. ISSN: 0093-691X.

Descriptors: animals, chlormadinone acetate, chorionic gonadotropin, diethylstilbestrol, dogs, embryo implantation, estrus, female, follicle stimulating hormone, gonadotropins, hydroxyprogesterones, luteinizing hormone, megestrol, norethindrone, pregnancy, progesterone.

Jochle, W. (1976). **Neuere Erkenntnisse über die Fortpflanzungsbiologie von Hund und Katze: Konsequenzen für die Ostruskontrolle, Konzeptionsverhütung, Abortauslösung und Therapie. [New findings on the physiology of reproduction in the dog and cat: consequences for the control of estrus, contraception abortion and therapy].** *Deutsche Tierärztliche Wochenschrift* 83(12): 564-569. ISSN: 0341-6593.

NAL Call Number: 41.8 D482

Descriptors: spontaneous abortion, antineoplastic agents, cats, contraception, dogs, estrus, female, pregnancy, progestational hormones, drug effects on reproduction.

Language of Text: German; Summary in English.

Jochle, W. (1994). **Neutralizacja hormonalna czy trzebieenie chirurgiczne suk i kotek? [Hormonal or surgical sterilization of bitches and queens?]**. *Medycyna Weterynaryjna* 50(11): 537-540. ISSN: 0025-8628.

Descriptors: pets, estrous cycle, reproductive physiology, drug therapy, postoperative complications, sterilization, progestogens, cats, dogs.

Language of Text: Polish.

Jochle, W. (1989). **Reproduction in the dog: reflections on past neglect and its consequences for society**. *Perspectives in Biology and Medicine* 33(1): 66-69. ISSN: 0031-5982.

NAL Call Number: 442.8 P43

Descriptors: dogs, estrus, female, reproduction, social control.

Jochle, W. (1987). **Zum Sexualzyklus der Hundin: Neuere Einsichten und Konsequenzen fur Therapie und Fortpflanzungskontrolle. [The sexual cycle in the bitch: recent insights and impact on therapy and reproduction control]**. *Tierärztliche Praxis* 15(3): 295-300. ISSN: 0303-6286.

NAL Call Number: SF603.V4

Abstract: Present knowledge about the estrous cycle of the bitch has been reviewed from a morphological, endocrinological and clinical point of view. This cycle is truly biphasic, characterized by its slow motion. It includes pregnancy or pseudopregnancy, and lactation. Corpus luteum function and regression as well as endometrial recovery, following endometrial desquamation at about day 100 of the cycle, are finalized at about days 140 to 150. Soon thereafter, subclinical preparations for the next proestrus can be recognized. Prolactin seems to play an important role as a luteotrophic agent, beginning at about day 30 to 35 of the cycle. Inhibition of prolactin secretion can be used to induce abortion, or to inhibit lactation and to shorten the cycle, or to treat clinical anestrus. Late metestrus and subclinical proestrus, i.e. days 120 to 170 of the cycle, is the most suitable period of the cycle to initiate suppression of the cycle, i.e. prevention of the next estrus, by using progestins with the least tendency for side effects. Article in German.

Descriptors: dogs, estrus synchronization, female, implications for contraception.

Language of Text: German; Summary in English.

Jochle, W. and A.C. Andersen (1977). **The estrous cycle in the dog: a review**. *Theriogenology* 7(3): 113-140. ISSN: 0093-691X.

Descriptors: dog physiology, estrus, female, pregnancy.

Johnston, S.D. (1991). **Questions and answers on the effects of surgically neutering dogs and cats**. *Journal of the American Veterinary Medical Association* 198(7): 1206-1214. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, cats, castration, ovariectomy.

Kalz, B. and K.M. Scheibe (2001). **Feral cats in a study area of the Berlin city -- population biology and influence of castration**. [Verwilderte Hauskatzen in einem Untersuchungsgebiet in Berlin-Mitte -- Populations biologie und Einfluss der Kastration]. In: *Aktuelle*

Arbeiten zur artgemassen Tierhaltung 2000. Vorträge anlässlich der 32. Internationalen Arbeitstagung Angewandte Ethologie bei Nutztieren der Deutschen Veterinärmedizinischen Gesellschaft e. V. Fachgruppe Verhaltensforschung, Freiburg-Breisgau, Kuratorium für Technik und Bauwesen in der Landwirtschaft e.V. (KTBL): Darmstadt, Germany. Vol. 403, p. 145-152.

Descriptors: castration, urban areas, vermin, vertebrate pests, cats.

Language of Text: German; Summary in English.

Kanchuk, M.L., R.C. Backus, C.C. Calvert, J.G. Morris, and Q.R. Rogers (2002). **Neutering induces changes in food intake, body weight, plasma insulin and leptin concentrations in normal and lipoprotein lipase-deficient male cats.** *Journal of Nutrition* 132(6 Supplement S2): 1730S-1732S. ISSN: 0022-3166.

NAL Call Number: 389.8 J82

Descriptors: nutrition, lipoprotein lipase deficiency, metabolic disease, obesity, nutritional disease, neutering, body weight, food intake.

Kanchuk, M.L., R.C. Backus, C.C. Calvert, J.G. Morris, and Q.R. Rogers (2003). **Weight gain in gonadectomized normal and lipoprotein lipase-deficient male domestic cats results from increased food intake and not decreased energy expenditure.** *Journal of Nutrition* 133(6): 1866-1874. ISSN: 0022-3166.

NAL Call Number: 389.8 J82

Descriptors: enzymology, metabolism, nutrition, obesity, nutritional disease, gonadectomy, adiposity, energy expenditure, food intake, weight gain.

Kaplan, B. (1981). **A technique of canine castration using anatomic structures for hemostasis.** *Veterinary Medicine: Small Animal Clinician* 76(2): 193-196. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: anesthesia, animals, methods of castration, dogs, hemostatic techniques, male.

Kato, G. (2001). **Proposals for contraception and castration methods in dogs and cats.** *Journal of Veterinary Medicine (Japan)* 54(4): 282-284. ISSN: 0447-0192.

NAL Call Number: SF761 .Z4

Descriptors: castration, contraception, canine, feline, reproduction, animal welfare.

Kawakami, E., T. Tsutsui, M. Shimizu, H. Orima, M. Fujita, and A. Ogasa (1995). **Comparison of the effects of chlormadinone acetate-pellet implantation and orchidectomy on benign prostatic hypertrophy in the dog.** *International Journal of Andrology* 18(5): 248-255. ISSN: 0105-6263.

NAL Call Number: QP251.I55

Abstract: Five beagles out of 11 dogs aged 7-10 years with benign prostatic hypertrophy (BPH) were implanted subcutaneously with pellets of the synthetic anti-androgen chlormadinone acetate (CMA) at a dose of 10 mg/kg bodyweight. The remaining six dogs (one beagle and five mongrel dogs) underwent bilateral orchidectomy. Changes in prostatic volume, histological findings in the prostate and the testis, and peripheral plasma levels of LH, testosterone and oestradiol-17 beta (E2) were assessed up until 24 and 4 weeks after CMA-implantation and orchidectomy, respectively. Measurements of the size of the prostate and

biopsies of the prostate were performed by laparotomy. Mean prostatic volume had decreased to 71% and 41%, respectively, of its pretreatment volume, by 4 weeks after CMA-implantation and orchidectomy, and was 49% and 47%, respectively, of pretreatment volume at 12 and 24 weeks after CMA-implantation. The clinical signs of BPH, e.g. haematuria, resolved within 2 weeks after either treatment. When the prostate was examined histologically 4 weeks after either treatment, hardly any evidence of active secretion (e.g. glandular epithelium projecting markedly into the lumen), was observed in CMA-implanted dogs, alveolar diameter and height of the glandular epithelium had decreased markedly and the glandular lumen had become very small in the orchidectomized dogs. By 12 weeks after CMA-implantation, degenerative and atrophic glands were observed in the prostate nearly the same as at 4 weeks after orchidectomy. In the testis the number of germ cells in the seminiferous tubules decreased markedly after CMA-implantation. The mean level of plasma LH at 4 weeks after orchidectomy had increased to 14.9 ng/ml, twice the value before operation. The mean levels of plasma testosterone and E2 at 4 weeks after CMA-implantation had decreased to 0.7 ng/ml and 9 pg/ml from 1.5 ng/ml and 15 pg/ml, the values before treatment, respectively. CMA-implantation resulted in poor semen quality. The results indicate that CMA-implantation at a dose of 10 mg/kg results in the same prostate-shrinking effect as orchidectomy.

Descriptors: dogs, anti-androgen chlormadinone acetate, oral contraceptives, orchidectomy, comparison study, semen quality, prostate-shrinking effect, drug implants.

Kawakami, E., T. Tsutsui, Y. Yamada, A. Ogasa, and M. Yamauchi (1988). **Spermatogenic function and fertility on unilateral cryptorchid dogs after orchiopexy and contralateral castration.** *Japanese Journal of Veterinary Science* 50(3): 754-762. ISSN: 0021-5295.

NAL Call Number: 41.8 J27

Descriptors: dogs, cryptorchidism, surgical operations, castration, spermatogenesis, fertility, testes, biopsy, semen, anatomy, animal anatomy, animals, biological techniques, body parts, canidae, carnivores, disorders, domestic animals, endocrine glands, functional disorders, glands, gonadectomy, infertility, injurious factors, male genital system, male infertility, mammals, pet animals, physiological functions, reproduction, reproductive disorders, sterilization, surgical operations, urogenital system, vertebrates.

Kipnis, R.M. (1981). **Comments on canine castration.** *Veterinary Medicine: Small Animal Clinician* 76(4): 446. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: dogs, surgery, methods of castration, male.

Kirby, F.D. (1980). **A technique for castrating the cryptorchid dog or cat.** *Veterinary Medicine: Small Animal Clinician* 75(4): 632. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: methods of castration, cats, cryptorchidism, dogs, male.

Kirkpatrick, J.F. and A.T. Rutberg (2001). **Fertility control in animals.** In: D.S. Salem and A.N. Rowan (editors), *State of the Animals 2001*, Humane Society Press: Washington, DC, p. 183-198. ISBN: 0-9658942-3-1.

Descriptors: humane control of wildlife, local population size, population control, fertility

control, immunocontraception, porcine zona pellucida vaccine, horses, deer, elephants, companion animals, ethics.

Kustritz, M. (1996). **Elective gonadectomy in the cat.** *Feline Practice* 24(6): 36-39. ISSN: 1057-6614.

NAL Call Number: SF985.F4

Abstract: Agricola

Descriptors: cats, ovariectomy, hysterectomy, castration, body condition, obesity, behavior change, metabolism.

Lanevski, A., J.W. Kramer, S.A. Greene, and K.M. Meyers (1996). **Fibrinolytic activity in dogs after surgically induced trauma.** *American Journal of Veterinary Research* 57(8): 1137-1140. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To determine whether alterations in the fibrinolytic pathway analytes, plasminogen (PLG), tissue plasminogen activator, and alpha 2-antiplasmin are significant in dogs subjected to minor and major surgical trauma. ANIMALS: 18 dogs in 3 groups of 6 each. PROCEDURE: Plasma fibrinolytic pathway analytes were measured in dogs with trauma of ovariohysterectomy (minor trauma) or orthopedic surgery (major trauma) and halothane anesthesia (control group). A commercial procedure adapted to a microtitration plate was used to measure the analytes. Blood was obtained 24 hours before anesthesia, at extubation (0 hours), and again at 2, 24, and 48 hours after extubation. An analyte quality-control strategy was maintained. RESULTS: In the major trauma group, there was a significant, transient, postsurgical decrease in PLG activity at 0 and 24 hours and a return to presurgical values by 48 hours. The minor trauma group had a similar trend without significant changes, including an increase in PLG values at 48 hours that exceeded the reference range. Antiplasmin values changed significantly in the major trauma group only. Tissue plasminogen activator values remained within the reference range. CONCLUSIONS: Tissue plasminogen activator was not considered a clinical marker of interest for detection of alterations in fibrinolysis after trauma. In contrast, plasma PLG and alpha 2-antiplasmin values may be useful in the evaluation of hemostatic complications of surgery. CLINICAL RELEVANCE: Identification of altered fibrinolysis in dogs undergoing traumatic surgery may provide a baseline for preventive pre- and postsurgical hemostatic care. **Descriptors:** fibrinolysis, hysterectomy, orthopedics, ovariectomy, wounds and injuries, anesthesia, antiplasmin analysis, biological markers, dogs, halothane, plasminogen, postoperative period, reference values, time factors.

Leverkusen, D.M. (1973). **Die Kastration der Katze. [Castration in the cat].** *Tierärztliche Praxis* 1(1): 195-203. ISSN: 0303-6286.

NAL Call Number: SF603.V4

Descriptors: anesthesia, methods of castration, cats, ovary, female.

Language of Text: German.

Luder, S. and P. Lueps (2002). **Hauskatzen beim Tierarzt: veterinaermedizinische und zoologische Daten auf Grund einer Erhebung in einer Praxis im Kanton Bern. [Domestic cats in a veterinary surgery: Not neglecting the zoological point of view.]**. *Mitteilungen Der Naturforschenden Gesellschaft in Bern* 59: 61-77. ISSN: 0077-6130.

Descriptors: cats, castration, veterinary surgery.

Language of Text: German; Summary in English.

Mahlow, J.C. (1999). **Estimation of the proportions of dogs and cats that are surgically sterilized.** *Journal of the American Veterinary Medical Association* 215(5): 640-643. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine an estimate of the proportions of dogs and cats in Texas that are surgically sterilized and whether those proportions differed according to species and sex of the animal, level of responsibility of the owner, or geographic location. DESIGN: Cross-sectional study. ANIMALS: 43,831 dogs and cats > or = 6 months old. PROCEDURE: Information on sterilization rates was provided by 14 licensing agencies and 16 animal shelters in diverse regions of Texas. Univariate and multivariate analyses were used to compare sterilization rates among subpopulations of animals (dogs vs cats, males vs females, sheltered vs licensed, rural vs urban location). RESULTS: Overall, 12,893 (29.4%) of the animals (26.9% of dogs and 32.6% of cats) were sterilized. Proportions of animals sterilized were significantly different among subpopulations. CONCLUSIONS AND CLINICAL RELEVANCE: Although the cause of pet overpopulation is multifaceted, failure of owners to spay and castrate their animals is a major contributing factor. Significant differences in sterilization rates among subpopulations of dogs and cats suggest that organizations encouraging spaying and castration should use motivational techniques specific for the pet owners they are targeting.

Descriptors: gonadectomy, sterilization statistics, dogs, cats, rural population, cross sectional study, owner responsibility, education.

Mandelker, L. (1978). **A sterile surgical procedure for feline castration (a photographic essay).**

Veterinary Medicine: Small Animal Clinician 73(7): 904-95. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: animals, asepsis, castration, cats, male.

Marholdt, D. (1973). **Die Kastration der Katze. [Feline castration]**. *Tierarztliche Praxis* 1(2): 195-203. ISSN: 0303-6286.

NAL Call Number: SF603.V4

Descriptors: anesthesia, cats, female, methods of castration, hysterectomy, postoperative care, premedication.

Language of Text: German.

Martin, L., B. Siliart, H. Dumon, R. Backus, V. Biourge, and P. Nguyen (2001). **Leptin, body fat content and energy expenditure in intact and gonadectomized adult cats: A preliminary study.** *Journal of Animal Physiology and Animal Nutrition* 85(7-8): 195-199. ISSN: 0044-3565.

NAL Call Number: 389.78 Z3

Descriptors: metabolism, nutrition, obesity, nutritional disease, gonadectomy, body weight, energy expenditure.

Martin, R.B., R.L. Butcher, L.L. Sherwood, P. Buckendahl, R.D. Boyd, D. Farris, N. Sharkey, and G. Dannucci (1987). **Effects of ovariectomy in beagle dogs.** *Bone* 8(1): 23-31. ISSN: 8756-3282.

NAL Call Number: RC930.B65

Abstract: Beagle dogs 3-7 years old were ovariectomized (n = 9) or sham operated (n = 6) and followed for 48 weeks with measurements of body weight, tibial shaft bone mineral content (BMC), and serum biochemistry. Following killing, measurements were made of bone strength and histomorphometry. Ovariectomy (OX) significantly reduced serum estrone and estradiol concentrations and their variability from month to month. There was a transient decrease in cortical BMC of the OX dogs during the first 12 postoperative weeks but no difference between the groups after 48 weeks. Serum osteocalcin was elevated, but there was little effect on serum alkaline phosphatase, Ca, P, or calcitonin. OX increased the number of tetracycline-labeled osteons in cortical bone but reduced the percent trabecular surface labeled with tetracycline. OX produced no significant changes in the composition of the bones or loss of cortical area, but a statistically significant 15% trabecular bone loss occurred in the spine. However, bone strength had not been significantly affected at the time of sacrifice.

Descriptors: disease models, animal, dogs, osteoporosis, ovariectomy, bone and bones analysis, calcium binding proteins, estradiol, osteocalcin, progesterone, spine.

Maute A.M., Koch D.A., and Montavon P.M. (2001). **Perineale Hernie beim Hund - Colopexie, Vasopexie, Cystopexie und Kastration als Therapie der Wahl bei 32 Hunden.** [Perineal hernia in dogs -- colopexy, vasopexy, cystopexy and castration as an alternative therapy in 32 dogs]. *Schweizer Archiv Fur Tierheilkunde* 143(7): 360-367. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Abstract: In 32 male dogs colopexy, vasopexy, cystopexy and castration was performed for the treatment of perineal hernia. Recurrence rate in this study is 22%, what is comparable to other studies using different methods. The degree of severity and the number of complications is lower with this technique than with others. Enlargement of the prostate was evident in 59% and bladder retroflexion in 22% of the dogs. A celiotomy allows to recognize, assess, reduce and fix displaced organs which is not possible by using other methods. The aim is to regain the tubular structure of the ampulla recti and to fix prostate and bladder cranioventrally to the pelvic entrance. The castration performed at the same time causes the prostate gland to atrophy within 2-3 weeks, what makes the pelvic entrance even wider and the dogs return to normal defecation.

Descriptors: hernia, perineum, surgery, treatment.

Language of Text: German; Summary in English.

McEntee, M.C. (2002). **Reproductive oncology.** *Clinical Techniques in Small Animal Practice* 17(3): 133-149. ISSN: 1096-2867.

NAL Call Number: SF911.S45

Descriptors: reproductive system, tumor biology, neoplastic disease, neutering, clinical techniques.

McLaughlin, K.C. and C.E. Hamner (1974). **A demonstration of cat seminal plasma antifertility activity.** *Proceedings of the Society for Experimental Biology and Medicine* 145(1): 103-106. ISSN: 0037-9727.

NAL Call Number: 442.9 So1

Descriptors: buffers, cats, centrifugation, fertilization, heat, pregnancy, rabbits, analysis of semen, species specificity, sperm capacitation, spermatozoa, time factors, trypsin inhibitors.

Medleau, L., D.T. Crowe, and D.L. Dawe (1983). **Effect of surgery on the in vitro response of canine peripheral blood lymphocytes to phytohemagglutinin.** *American Journal Of Veterinary Research* 44(5): 859-860. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: The effects of surgery (ovario-hysterectomy) and anesthesia on phytohemagglutinin-induced lymphocyte blastogenesis were studied in vitro in 12 dogs. Four dogs had depressed lymphocyte blastogenic responses after surgery. This suppression was transient with normal blastogenic responses occurring in cells from all dogs 24 hours after surgery. Seemingly, T-lymphocyte function may be depressed, only transiently, after surgery.

Descriptors: anesthesia, antibody formation, castration, dogs, female, hysterectomy, lymphocyte activation, phytohemagglutinins.

Millis, D.L., J.G. Hauptman, and M. Richter (1992). **Preoperative and postoperative hemostatic profiles of dogs undergoing ovariohysterectomy.** *Cornell Veterinarian* 82(4): 465-470. ISSN: 0010-8901.

Descriptors: dog diseases, surgical operations, postoperative complications, haematology, ovariectomy, hysterectomy.

Minami, S., Y. Okamoto, H. Eguchi, and K. Kato (1997). **Successful laparoscopy assisted ovariohysterectomy in two dogs with pyometra.** *The Journal of Veterinary Medical Science* 59(9): 845-847. ISSN: 0916-7250.

NAL Call Number: SF604.J342

Abstract: Two dogs with pyometra were treated by laparoscopy assisted ovariohysterectomy. Hemostasis of the mesovarium was achieved with an ultrasonic scalpel and hemoclips. Both ovaries and the uterus were exposed via a 10-mm caudal port that was enlarged to 3 cm and the uterine cervix was excised after ligation of the uterine arteries. These cases were the first report on ovariohysterectomy for pyometra by laparoscopy assisted surgery in the veterinary field.

Descriptors: pyometra, ovariectomy, hemostasis, laparoscopy, uterine diseases, dogs.

Misk, N.A. and S.M. Seleim (1991). **Castration in dogs (a comparative study).** *Assiut Veterinary Medical Journal* 26(51): 228-234. ISSN: 1012-5973.

NAL Call Number: SF604.A77

Descriptors: postoperative complications, veterinary surgery, castration techniques, dogs.

Language of Text: English; Summary in Arabic.

Mojzisova, J., R. Hromada, I. Valocky, S. Paulik, V. Hipikova, V. Bajova, S. Posivakova, and A. Bugarsky (2003). **Effect of ovariectomy on canine postsurgical leukocyte function.** *Acta Veterinaria Hungarica* 51(2): 219-227. ISSN: 0236-6290.

NAL Call Number: 41.8 Ac83

Abstract: The effect of surgery on phagocytic activity of blood leukocytes and mitogen-induced blastogenesis of lymphocytes was studied in fourteen dogs. Simple ovariectomy with anaesthesia induced by ketamine and xylazine or by ketamine, xylazine and halothane caused a short nonsignificant depression of phagocytic activity that persisted for four hours after surgery. Ingestion capacity of leukocytes decreased significantly immediately after surgery. Mitogen-induced blastogenesis of lymphocytes was depressed significantly in the first 48 hours and despite partial recovery this parameter did not reach the value of the control groups until the end of observation (7 days). A more conspicuous decrease of blastogenic response of blood lymphocytes to mitogens was found after the use of ketamine and xylazine in a dose maintaining anaesthesia. Anaesthesia with ketamine and xylazine in the lower dose and maintained with halothane resulted in a later improvement of the blastogenic response of lymphocytes.

Descriptors: dissociative anesthetics, dogs, halothane, hysterectomy, ketamine, leukocyte count, leukocytes, ovariectomy, phagocytosis, xylazine.

Muller, S.C., J.T. Hsieh, T.F. Lue, and E.A. Tanagho (1988). **Castration and erection. An animal study.** *European Urology* 15(1-2): 118-124. ISSN: 0302-2838.

Abstract: Castrated dogs (n = 3) need a much higher threshold level of energy to induce erection by electrical stimulation of the cavernous nerve than noncastrated animals (n = 24). In addition the resulting quality of erection, measured as maximal intracavernous pressure (pCC) versus peak systolic blood pressure (BP), was weaker in castrated dogs (pCC = 57% of BP on average) than in noncastrated dogs (pCC = 80% of BP on average). A high venous outflow from the corpora cavernosa in castrated dogs can also explain the shorter duration of erection. This experimental model excludes the interference of subjective factors, such as erotic stimuli and libido on erection, and it seems that androgen deficiency has a direct effect on the neurophysiology of the erectile tissues resulting in a higher tonus of the detumescence factors, which can be explained by an incomplete relaxation of the sinusoidal smooth muscle.

Descriptors: androgens physiology, orchietomy, penile erection, penis physiology, dogs, electric stimulation.

Murphy, J.V. (1990). **Methods of spaying.** *The Veterinary Record* 127(8): 219-220. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: animals, dogs, female, female genitalia, ovariectomy.

Nassar, R. and J.E. Mosier (1982). **Feline population dynamics: a study of the Manhattan, Kansas, feline population.** *American Journal of Veterinary Research* 43(1): 167-70. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: Analysis of the age-specific birth and survival rates and the age distribution in the pet population of cats in Manhattan, Kansas, revealed that the rate of population change

(lambda) was about 1.18. This means that under present birth and death rates, the cat population can increase by about 18% per year. In reality, the increase may not be as high since pet ownership may not increase by as much. The frequency of spayed females of reproductive age in the Manhattan population was about 59%. This may not be sufficient to curb population growth. With the present age-specific survival rates, about 88% of the females should be spayed if the population is to remain stable. The ratio of people to cats in Manhattan was estimated to be 5.2:1. The average number of cats per household was 0.508. The percentage of households with cats was 28 with an average of 1.74 cats per household. In comparison, the average number of dogs per household was 0.43 and the percentage of households with dogs was 43 with an average of 1.36 dogs per household. The methods used in this study are useful for collecting and analyzing data to be used by governmental bodies and veterinarians concerned with proposals to regulate pet population growth and reproduction.

Descriptors: cats, castration veterinary, Kansas, longevity, mortality, population control, population dynamics.

Nassar, R., J.E. Mosier, and L.W. Williams (1984). **Study of the feline and canine populations in the greater Las Vegas area.** *American Journal of Veterinary Research* 45(2): 282-7. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: Analysis of household dogs and cats, based on age-distribution data and on age-specific birth and survival rates, as well as on pet source, indicated that the dog and cat populations are stable and not increasing in size (lambda congruent to 1). Roaming dogs and cats euthanatized at the pound represented about 5.7% and 8.1% of the estimated dog and cat populations, respectively. The death at the pound seems to be effective in checking pet population growth. Among pets acquired, 84% were less than 1 year of age for dogs as compared with 88% for cats. Breeders and pet shops supplied about 7% of cats and 17% of dogs. About 10% of cats and 10% of dogs were acquired at the pound, while 6.4% of dogs and 14% of cats were acquired as stray. About 45% of dogs and 41% of cats were acquired from pet owners. Some dogs (12.46%) and cats (12%) were imported from outside the Las Vegas area. Of dogs and cats below 2 months of age, 33% and 19.5%, respectively, came from breeders or pet shops or were imported from outside the area. Seventeen percent of unspayed female dogs and 16% of unspayed female cats reproduced. The percentages of spayed females were 77 for dogs and 86 for cats. Forty-five percent of the dogs and 48% of the cats were males. Among dogs at the shelter, 2% were neutered and 26% spayed. At the pound, 24% of dogs were small breeds, 24% medium size breeds, and 52% large breeds.

Descriptors: cats, dogs, age factors, animals, domestic, castration, population control, population dynamics, questionnaires.

Nomura, K. and T. Makino (1997). **Effect of ovariectomy in the early first half of the diestrus on induction or maintenance of canine deciduoma.** *The Journal of Veterinary Medical Science* 59(3): 227-230. ISSN: 0916-7250.

NAL Call Number: SF604.J342

Abstract: The effect of ovariectomy in the early first half of the diestrus was examined on the induction or maintenance of suture-induced canine deciduoma. Ovariectomy immediately, or some days, after the insertion of suture had no effect on the induction or maintenance

of deciduoma. Even when ovariectomy was performed within 4 days before insertion, deciduoma could be induced in spite of there being no ovary. However, when ovariectomy was done 4 or more days before suture insertion, the rate of deciduoma was decreased or no deciduoma was induced. These results indicate that the influence of the ovary on the endometrium may persist for at least 4 days after ovariectomy. Ovariectomy after the suture insertion had few effects. It is suggested that canine uterine glands in the early first half of the diestrus maintain a certain degree of self-proliferative ability even after ovariectomy, and thus canine deciduoma is not as dependent on the ovary that of the rodentia.

Descriptors: ovariectomy, body weight, cell division, decidua, diestrus, laparotomy, ovary, female, suture techniques.

Nurse, R.G. (1980). **Spaying of bitches.** *The Veterinary Record* 106(6): 134. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: dogs, methods of castration, female, surgery.

Okkens, A.C. (1981). **Ovario-hysterectomie bij de hond. [Ovariohysterectomy in dogs].** *Tijdschrift Voor Diergeneeskunde* 106(22): 1129-1141. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Abstract: A brief introductory part is followed by a discussion of the age of the bitch and that stage of the oestrous cycle, during which ovariohysterectomy can best be performed. The various indications for ovariectomy and ovariohysterectomy are reviewed. A number of important anatomical features are briefly referred to and the technique of ovariohysterectomy is described in detail. Attention is paid to a number of complications such as haemorrhage during or after operation and the escape of infected contents of the uterus into the abdominal cavity. Finally, the possible effects of ovariohysterectomy, such as a gain in weight, a change of character, incontinence of urine and the appearance of an infantile vulva associated with pruritus vulvae, are discussed.

Descriptors: age factors, animal behavior, methods of castration, body weight, postoperative complications, uterus, hysterectomy, dogs.

Language of Text: Dutch; Summary in English.

Okkens, A.C., H.S. Kooistra, and R.F. Nickel (2002). **Vergelijking van lange termijn effecten van ovariectomie versus ovariohysterectomie bij de teef. [Comparison of long term side effects of ovariectomy versus ovariohysterectomy in the bitch].** *Tijdschrift Voor Diergeneeskunde* 127(11): 369-372. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: comparative study, dogs, female, hysterectomy, ovariectomy, reproductive sterilization, time factors, urinary incontinence.

Language of Text: Dutch.

Ozanne-Smith, J., K. Ashby, and V.Z. Stathakis (2001). **Dog bite and injury prevention--analysis, critical review, and research agenda.** *Injury Prevention* 7(4): 321-326. ISSN: 1353-8047.

Abstract: OBJECTIVES: To analyze Australian dog bite injury data and make international comparisons; to review risk and protective factors relating to the dog, injured person, and environment; and to recommend action for prevention and research. METHODS: Aus-

tralian dog bite injury data, complemented by detailed Victorian and regional data from routine health records and vital statistics, were analyzed to determine incidence, severity, nature, circumstances, and trends. International comparison data were extracted from published reports. Risk and protective factor studies were selected for review from electronic and bibliographic searches where data were recent, sample sizes substantial, and bias limited. RESULTS: The Australian dog bite death rate (0.004/100,000) is lower than both the United States (0.05-0.07/100,000) and Canadian rates (0.007/100,000). Victorian hospitalized trend rates were stable between 1987 and 1998, but there was a decline for children <5 years ($p=0.019$) corresponding with a reduction in dog ownership. Children 0-4 years have the highest rate of serious injury, particularly facial. Adults have longer hospitalizations, most frequently for upper extremity injury. Risk factors include: child, males, households with dogs, certain breeds, male dogs, home location, and leashed dog. CONCLUSIONS: Dog bite rates are high and it may therefore be assumed that current preventative interventions are inadequate. Responsible dog ownership, including separating young children from dogs, avoiding high risk dogs, neutering, regulatory enforcement, and standardized monitoring of bite rates are required. Controlled investigations of further risk and protective factors, and validated methods of breed identification, are needed.

Descriptors: animals, Australia, bites, dogs, hospitalization, human, risk factors, responsible dog ownership.

Padley, R.J., D.B. Dixon, and W.J.R. Wu (2002). **Effect of castration on endothelin receptors.** *Clinical Science* 103(Suppl. 48): 442S-445S. ISSN: 0143-5221.

Descriptors: endocrine system, prostate cancer, neoplastic disease, reproductive system disease, male, urologic disease, castration, surgical methods, hormone ablation therapy.

Peters, M.A.J. and F.J.v. Sluijs (2002). **Decision analysis tree for deciding whether to remove an undescended testis from a young dog.** *The Veterinary Record* 150(13): 408-411. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: dogs, testes, decision analysis, lifespan, risk factors, postoperative complications, cryptorchidism, surgical operations.

Philibert, J.C., P.W. Snyder, N. Glickman, L.T. Glickman, D.W. Knapp, and D.J. Waters (2003). **Influence of host factors on survival in dogs with malignant mammary gland tumors.** *Journal of Veterinary Internal Medicine* 17(1): 102-106. ISSN: 0891-6640.

NAL Call Number: SF601.J65

Descriptors: carcinoma, hormone secretion, mammary gland neoplasms, metastasis, mortality, neoplasms, obesity, ovariectomy, survival, dogs.

Pinto, C.R.F., D.L. Paccamonti, and B. Partington (2001). **Theriogenology question of the month.** *Journal of the American Veterinary Medical Association* 219(10): 1343-1345. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: spermatic cord torsion, swollen testes, orchiectomy, surgical method, ultrasonography.

Pittaway, D.E. (1983). **Inhibition of testosterone synthesis in the canine testis in vitro.** *Contraception* 27(4): 431-436. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: Testicular 17 beta-hydroxysteroid oxidoreductase (17 beta-HOR) is one of the several enzymes necessary for the synthesis of testosterone, but is not required for either glucocorticoid or mineralocorticoid synthesis. Since specific inhibition of the testicular enzyme has potential contraceptive and experimental uses, the inhibitory effect of twenty steroids on 17 beta-HOR activity was examined in microsomal preparations of canine testes. Six steroids inhibited testosterone formation, but only 4-estrene-3,17-dione (KI = 2.4 microM) and 5-androstene-3,17-dione (KI = 6.8 microM) had significant inhibitory activity. The data suggest the following molecular characteristics necessary for competitive inhibition of 17 beta-HOR activity: (a) requirement for 17-keto group, (b) relative requirement for 3-keto group, (c) decreased inhibition with unsaturation in position 5-6, and (d) marked loss of inhibitory activity with 6 beta-, 11 beta- or 19- hydroxylation, and A-ring aromatization.

Descriptors: 17 hydroxysteroid dehydrogenases, dogs, male, contraceptive potential, testosterone, inhibition of testicula enzyme.

Plah, S. (1990). **Methods of spaying. [Correspondence].** *The Veterinary Record* 127(21): 531. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: cats, ovariectomy, gonadectomy, sterilization, surgical operations, urogenital system, postoperative complications.

Platt, S. (1990). **Methods of spaying.** *The Veterinary Record* 127(21): 531. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: cats, female, megestrol, ovariectomy, vaginal diseases.

Power, S.C., K.E. Eggleton, A.J. Aaron, P.E. Holt, and P.J. Cripps (1998). **Urethral sphincter mechanism incompetence in the male dogs: importance of bladder neck position, proximal urethral length and castration.** *The Journal of Small Animal Practice* 39(2): 69-72. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: dogs, urinary incontinence, sphincters, bladder, urethra, length, position, size, prostate, castration, physiopathology.

Renauld, A., I. Von Lawzewitsch, R.C. Sverdlik, R.L. Perez, R.R. Rodriguez, and V.G. Foglia (1988). **On changes in pancreas cytomorphometry, serum insulin and metabolic adjustments induced by long term orchidectomy and substitutive therapy with testosterone in dogs.** *Acta Physiologica Et Pharmacologica Latinoamericana: Organo De La Asociacion Latinoamericana De Ciencias Fisiologicas y De La Asociacion Latinoamericana De Farmacologia* 38(3): 345-361. ISSN: 0326-6656.

NAL Call Number: QP1.A27

Abstract: Mongrel, male, fasted, unanesthetized dogs under the following alternative treatments: 1) nil, 2) orchidectomy 4 months before the study, 3) orchidectomy 10 months in advance, 4) orchidectomy like in (3) followed by i.m. propylenglycol treatment, 0.05 ml/kg

body wt./day, 15 days (vehicle controls, and 5) testosterone hemisuccinate in propylenglycol, 0.75 mg in 0.05 ml/kg body wt./day, for 15 days, were used in this study. Pancreas slices of animals of every group were stained with immunoperoxidase. The animals were fasted, anesthetized for pancreas removal. Pancreatic section mean absorbance was estimated in a Zeiss cytospectrophotometer with a coupled computer. Blood sugar (BS) and both serum, immunoreactive insulin (IRI) and free fatty acids (FFA) were assayed in these.

Descriptors: animal, blood glucose, dogs, fatty acids, insulin, orchietomy, testosterone.

Ridyard, A.E., E.A. Welsh, and D.A. Gunn Moore (2000). **Successful treatment of uterine torsion in a cat with severe metabolic and haemostatic complications.** *Journal of Feline Medicine and Surgery* 2(2): 115-119. ISSN: 1098-612X.

NAL Call Number: SF985.J68

Abstract: A peri-parturient fifteen-month-old female Maine Coon cat was presented with extreme weakness and depression, profound hypovolaemia and hypothermia. Severe hyperkalaemia, hyponatraemia and anaemia were detected. Disseminated intravascular coagulation was suspected due to marked prolongation of activated partial thromboplastin time. Uterine torsion was diagnosed at exploratory laparotomy. The cat made a full recovery following ovariohysterectomy and intensive supportive therapy.

Descriptors: pregnancy complications, uterine diseases, cat diseases, cats, fetal death, hysterectomy, ovariectomy, partial thromboplastin, torsion.

Robbins, M.A. and H.S. Mullen (1994). **En bloc ovariohysterectomy as a treatment for dystocia in dogs and cats.** *Veterinary Surgery* 23(1): 48-52. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: En bloc ovariohysterectomy, a technique that involves ovariohysterectomy before hysterotomy and removal of the neonates, was performed on 63 animals (37 dogs and 26 cats). Intraoperative complications were limited to 1 cat that bled excessively during surgery and was later found to have a clotting disorder. Postoperative complications included anemia that required blood transfusion in 3 cats, uroperitoneum in 1 dog, and death in 1 cat. The rate of neonatal survival (75% for dogs and 42% for cats) was similar to that documented by previous studies of medical and surgical management of dystocia. We concluded that en bloc ovariohysterectomy is a safe and effective alternative to cesarean section for surgical treatment of dystocia in dogs and cats.

Descriptors: dog diseases, cat diseases, reproductive disorders, surgery, postoperative complications, parturition complications, dystocia, hysterectomy, ovariectomy, dogs, cats.

Rubin, L.D. and D.C. Maplesden (1978). **Ovariohysterectomy in dogs and cats.** *Veterinary Medicine: Small Animal Clinician* 73(4): 467-471. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: methods of castration, cats, dogs, female, hysterectomy.

Salmeri, K., P. Olson, and M. Bloomberg (1991). **Elective gonadectomy in dogs: A review.** *Journal of the American Veterinary Medical Association* 198(7): 1183-1192. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, castration, ovariectomy, age, sex hormones, biological development,

skeleton, obesity, animal behavior, secondary sexual traits, urinary tract, anesthesia, disease resistance.

Santen, R.J., E. Samojlik, L. Demers, and E. Badder (1980). **Adrenal of male dog secretes androgens and estrogens.** *American Journal Of Physiology* 239(2): E109-E112. ISSN: 0002-9513.
NAL Call Number: 447.8 Am3

Abstract: In the absence of functioning gonads, the adrenal is an important source of androgens and estrogens. In order to precisely quantitate the adrenal secretion rates of the sex steroids, we cannulated the adrenal veins and measured venous blood flow and arterial venous steroid gradients in adult male beagle dogs under pentobarbital anesthesia. Celite chromatography and specific radioimmunoassays were utilized to measure steroid levels. During basal conditions, the adrenal produced larger amounts of the androgens (667 ng/min of androstenedione, 5.45 ng/min of testosterone, and 3.43 ng/min of dihydrotestosterone) than of the estrogens (1.245 ng/min of estradiol and 0.239 ng/min of estrone. These secretion rates were 20- to 50,000-fold less than that of cortisol (12,360 ng/min). Studies were also carried out during adrenal suppression with hydrocortisone to block ACTH release and with the adrenal steroidogenesis inhibitor, aminoglutethimide, plus hydrocortisone. The secretion rates of each androgen measured fell during ACTH inhibition. Significant suppression of estrone and estradiol, however, required addition of aminoglutethimide. This study provides direct evidence that the adrenal in the male dog can secrete estrogens, a previously controversial issue.

Descriptors: adrenal glands, androstenediols, androstenols, castration, dogs, drug therapy, estradiol, sex factors, testosterone, estrogens.

Schaefers-Okkens, A.C. and H.S. Kooistra (2002). **Ovariectomie van de teef. [Ovariectomy in the bitch].** *Tijdschrift Voor Diergeneeskunde* 127(19): 590-591. ISSN: 0040-7453.
NAL Call Number: 41.8 T431

Descriptors: age factors, animals, dogs, estrus, female, adverse effects of ovariectomy.

Language of Text: Dutch.

Scott, K.C., J.K. Levy, S.P. Gorman, and S.M. Newell (2002). **Body condition of feral cats and the effect of neutering.** *Journal of Applied Animal Welfare Science* 5(3): 203-213. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: Considerable debate exists regarding the most appropriate methods for controlling feral cat populations, both from humane and logistical points of view. The physical condition of feral cats has not been reported, and it is not known if these cats benefit from neutering. This study investigates the body condition of feral cats by measuring body weight (BW), body condition score (BCS; Burkholder, 2000; Laflamme, Kealy, & Schmidt, 1994), and falciform fat pad. The study includes lateral abdominal radiographs taken at the time of neutering of 105 adult feral cats for measurement of falciform fat pad depth and area. At that time we also assessed BW and BCS. One year later we assessed the effects of neutering on body condition by evaluating a subsample of 14 cats. At the time of surgery, the cats were lean but not emaciated (BW 3.1 +/- 0.9 kg; BCS 4 +/- 1; based on a 1 to 9 scale ranging from 1 [emaciated] to 9 [grossly obese]). Falciform fat pad depth and area averaged 7.1 mm

and 197.4 mm², respectively, indicating a small amount of fat. Fourteen cats, reevaluated 1 year after neutering, increased 260% + 90% in falciform fat pad depth, 420% +/- 390% in fat pad area, 40% +/- 4% in BW, and 1 level in BCS ranking (1 to 9 scale; all differences p < .001). Similar to confined socialized cats, feral cats gained significant weight and body fat after neutering.

Descriptors: feral cat population control, castration, neutering, body condition score, adipose tissue, body weight.

Senn, R. (1981). **Kastrierplattchen mit Spannbugel. [Castration device with tension plate for cats]**. *Kleintier-Praxis* 26(5): 307. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: apparatus, techniques, surgical instruments, castration, cats.

Language of Text: German; Summary in English, French, and Italian.

Shen, V., D.W. Dempster, R. Birchman, R.W.E. Mellish, E. Church, D. Kohn, and R. Lindsay (1992). **Lack of changes in histomorphometric, bone mass, and biochemical parameters in ovariohysterectomized dogs.** *Bone* 13(4): 311-316. ISSN: 8756-3282.

NAL Call Number: RC930.B65

Descriptors: osteopenia, ovaries, uterus, ablation, effects on, bone mass, histomorphometry, dogs, animal models, osteoporosis.

Shille, V.M. and G.H. Stabenfeldt (1980). **Current concepts in reproduction of the dog and cat.** *Advances in Veterinary Science and Comparative Medicine* 24: 211-243. ISSN: 0065-3519.

NAL Call Number: 41.8 Ad9

Descriptors: cats, dogs, contraception, estrus, artificial insemination, reproduction, ovulation, sexual behavior.

Shiroma, J.T., J.K. Gabriel, R.L. Carter, S.L. Scruggs, and P.W. Stubbs (1999). **Effect of reproductive status on feline renal size.** *Veterinary Radiology and Ultrasound* 40(3): 242-245. ISSN: 1058-8183.

NAL Call Number: SF757.8.A4

Descriptors: cats, kidneys, length, width, radiography, sex differences, normal values, castration, ovariectomized females, male animals.

Sinowatz, F. (1984). **Early changes in the dog prostate after castration. An ultrastructural study. [Fruehe Veraenderungen an der Prostata des Hundes nach Kastration. Eine feinstrukturelle Untersuchung]**. *Acta Anatomica* 120(3): 103-107. ISSN: 0001-5180.

NAL Call Number: 444.8 Ac8Z

Abstract: Using electron microscopic techniques the prostate glands of male Beagle dogs were studied 3 days after castration. At this time marked differences in the extent of alterations of the glandular epithelium were observed: Whereas several acini showed only minor changes with reduction of epithelial height and diminution of secretory granules, many acini were severely affected with pronounced alteration of cellular structure and accumulation of large lipid droplets. A constant feature was the stimulation of the basal cells of the glandular epithelium. Additionally, in some areas of the gland aggregations of stimulated basal cells

forming an acinus-like structure with a slit-like lumen were found. Our study shows that castration leads to marked alterations of prostatic epithelium within a short time. Androgen deprivation causes regressive changes of secretory epithelial cells, but clearly stimulates the basal cell population.

Descriptors: dogs, epithelium, male, electron microscopy, postoperative period, prostate, prostatectomy.

Language of Text: German; Summary in English.

Sohst, S., E. Sohst, and W. Busch (2002). **Erfahrungen bei der Kastration von weiblichen Katzen -- eine Patientenstatistik.** [Experiences in castration of female cats]. *Kleintier-Praxis* 47(9): 533-539. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: castration, diagnosis, healing, surgery, wounds, cats.

Sorenmo, K.U., F.S. Shofer, and M.H. Goldschmidt (2000). **Effect of spaying and timing of spaying on survival of dogs with mammary carcinoma.** *Journal of Veterinary Internal Medicine* 14(3): 266-270. ISSN: 0891-6640.

NAL Call Number: SF601.J65

Abstract: The risk of developing mammary gland tumors in dogs is significantly decreased by ovariectomy at an early age. However, previous studies have not found a benefit to ovariectomy concurrent with tumor removal in dogs with established mammary gland tumors, suggesting that the progression of these tumors is independent of continued estrogen stimulation. The purpose of this study was to evaluate the effect of spaying and of the timing of spaying on survival in dogs with mammary gland carcinoma. Signalment, spay status and spay age, tumor characteristics, treatment, survival, and cause of death of 137 dogs with mammary gland carcinoma were analyzed. The dogs were classified into 3 groups according to spay status and spay time: intact dogs, dogs spayed less than 2 years before tumor surgery (SPAY 1), and dogs spayed more than 2 years before their tumor surgery (SPAY 2). Dogs in the SPAY 1 group lived significantly longer than dogs in SPAY 2 and intact dogs (median survival of 755 days, versus 301 and 286 days, respectively, $P = .02$ and $.03$). After adjusting for differences between the spay groups with regard to age, histologic differentiation, and vascular invasion, SPAY 1 dogs survived 45% longer compared to dogs that were either intact or in the SPAY 2 group (RR = .55; 95% CI .32-.93; $P = .03$). This study reveals ovariectomy to be an effective adjunct to tumor removal in dogs with mammary gland carcinoma and that the timing of ovariectomy is important in influencing survival.

Descriptors: dog diseases, hysterectomy, mammary neoplasms, animal mortality, ovariectomy, disease progression, dogs, animal surgery, epidemiology, retrospective studies, survival analysis, time factors.

Spain, C.V., J.M. Scarlett, and S.M. Cully (2002). **When to neuter dogs and cats: a survey of New York state veterinarians' practices and beliefs.** *Journal of the American Animal Hospital Association* 38(5): 482-488. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Descriptors: veterinarians, small animal practice, cats, dogs, castration, ovariectomy, age, surveys, New York.

Tivers, M.S., T.R.D. Travis, R.V. Windsor, and A. Hotston Moore (2002). **Castration of the dog: a comparison of methods currently employed in practice with those taught at the UK veterinary schools.** *Journal of Small Animal Practice* 43(8): 364. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: Clinical research abstract presented at the 45th British Small Animal Veterinary Association Congress, Birmingham, UK, April 4-7, 2002.

Descriptors: castration, veterinary schools, veterinary practice, questionnaire, meeting abstract.

Tivers, M.S., T.R.D. Travis, R.V. Windsor, and A. Hotston Moore (2002). **Ovariohysterectomy in the bitch: a comparison of methods currently employed in practice with those taught at UK veterinary schools.** *The Journal of Small Animal Practice* 43(8): 364. ISBN.

NAL Call Number:41.8 J8292

Abstract: Clinical research abstract presented at the 45th British Small Animal Veterinary Association Congress, Birmingham, UK, April 4-7, 2002.

Descriptors: veterinary schools, veterinary medicine, urinary incontinence, questionnaires, castration, ovariohysterectomy, meeting abstract.

Vannozzi, I., C. Benetti, and A. Rota (2002). **Laparoscopic cryptorchidectomy in a cat.** *Journal of Feline Medicine and Surgery* 4(4): 201-203. ISSN: 1098-612X.

NAL Call Number: SF985.J68

Abstract: Several techniques for castration of cryptorchid cats have been described. In this case report, the use of laparoscopy for castration of a bilateral cryptorchid cat (with testes located in the abdomen) is described. Three trocars were inserted into the abdominal cavity, the testicles were easily identified adjacent to the urinary bladder. Haemostasis of the gubernaculum testis and spermatic cord was achieved with bipolar cauterisation. The testicles were easily removed in approximately 20 min. To the authors' knowledge this is the first report of the use of laparoscopy for the treatment of cryptorchidism in cats.

Descriptors: laparoscopic castration, cryptorchidism, cats, orchiectomy methods.

Verwer, M.A. (1980). **Sterilisatie hond (II). [Sterilization of dogs. II.]**. *Tijdschrift Voor Diergeneeskunde* 105(6): 251. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: animals, dogs, reproductive sterilization.

Language of Text: Dutch.

Volpe, P., B. Izzo, M. Russo, and L. Iannetti (2001). **Intrauterine device for contraception in dogs.** *The Veterinary Record* 149(3): 77-79. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: A new intrauterine device for contraception was tested on nine bitches. After it had been implanted, the bitches were mated but none of them became pregnant. Over a two-year period no side effects were observed, except in a bulldog bitch in which signs of oestrus persisted until the device had been removed.

Descriptors: contraception, intrauterine devices, dogs.

- White, R.A. (2001). **Ovariectomy or ovariectomy.** *Proceedings of the North American Veterinary Conference* 15: 667.
NAL Call Number: SF605.N672
Descriptors: bitches, cats, ovariectomy, hysterectomy.
- Wildt, D.E. and S.W. Seager (1977). **Reproduction control in dogs.** *The Veterinary Clinics of North America* 7(4): 775-787. ISSN: 0091-0279.
NAL Call Number: SF601.V523
Descriptors: castration, contraception, contraceptive devices, dogs, estrus, hysterectomy, immunization, megestrol, nandrolone, ovulation, tubal sterilization, vasectomy.
- Wilson, G.P. (1975). **Symposium on surgical techniques in small animal practice. Surgery of the male reproductive tract.** *The Veterinary Clinics of North America* 5(3): 537-550. ISSN: 0091-0279.
NAL Call Number: SF601.V523
Descriptors: anal gland neoplasms, biopsy, castration, cryptorchidism, dogs, hernia, vasectomy, prostatectomy, male genitalia.
- Wilson, G.P. and H.M. Hayes Jr. (1983). **Ovariohysterectomy in the dog and cat.** In: M.J. Bojrab (editor), *Current Techniques in Small Animal Surgery*, 2nd edition, Lea and Febiger: Philadelphia, PA, p. 334-351. ISBN: 0812108620.
NAL Call Number: SF991.C87 1983
Descriptors: anaesthesia, postoperative complications, caesarean section, hysterectomy, surgery, dogs, cats.
- Zielonka, T.M., D. Charpin, P. Berbis, P. Luciani, D. Casanova, and D. Vervloet (1994). **Effects of castration and testosterone on Fel dI production by sebaceous glands of male cats: I--Immunological assessment.** *Clinical and Experimental Allergy* 24(12): 1169-1173. ISSN: 0954-7894.
Abstract: Fel dI is produced by salivary and sebaceous glands. Hormonal control of sebum production is clearly established. The influence of cat castration and supplementary treatment with testosterone on the production of sebum and Fel dI in cat skin have been researched in this study. On day 1, 12 male cats were anaesthetized and three skin areas carefully shaven. Then the level of lipids on skin surface was measured by means of a photometric method. Finally, the three areas of skin were washed with 5ml of distilled water through a plastic cylinder. Fel dI collected in the washes was measured with a two-site monoclonal antibody based ELISA. On day 2, six cats were castrated, the other six were used as a control group. Two and 4 weeks later, the levels of lipids and Fel dI in skin washes were measured again in all cats. On day 30, the six castrated cats were injected intramuscularly with prolonged-action testosterone. Two weeks later, quantification of lipids and Fel dI in all animals was repeated. Sebum and Fel dI levels decreased in all castrated animals. Injecting the castrated cats with testosterone led to a significant increase in sebum and Fel dI production. Our findings indicate that Fel dI production is influenced by the production of hormones.
Descriptors: allergens, animals, monoclonal antibodies, castration, cats, enzyme-linked immunosorbent assay, glycoproteins, sebaceous glands.

Anesthesia and Analgesia

Anonymous (2002). **Meeting Abstracts: Proceedings of the American College of Veterinary Anesthesiologists 26th Annual Meeting, New Orleans, Louisiana, 11-12 October 2001.**

Veterinary Anaesthesia and Analgesia 29(2): 97-112. ISSN: 1467-2987.

NAL Call Number: SF914.V47

Descriptors: acepromazine, acupuncture, anesthesia, anesthetics, analgesics, atropine, blood chemistry, blood gases, body temperature, butorphanol, carbon dioxide, cardiovascular system, castration, conduction anesthesia, detomidine, diazepam, dosage effects, endorphins, fentanyl, foals, hypovolemia, induction, inhaled anesthetics, intramuscular injection, intravenous injection, isoflurane, ketamine, laparoscopy, morphine, nitrous oxide, ovariectomy, pain, pharmacodynamics, pharmacokinetics, propofol, pulse, respiration, resuscitation, sterilization, surgery, surgical operations, uptake, wounds, xylazine.

Ansah, O.B., O. Vainio, C. Hellsten, and M. Raekallio (2002). **Postoperative pain control in cats: clinical trials with medetomidine and butorphanol.** *Veterinary Surgery* 31(2): 99-103.

ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVE: To evaluate the analgesic effects of medetomidine (MED) and butorphanol (BTO) in cats after ovariohysterectomy. STUDY DESIGN: A placebo-controlled, blinded monocenter clinical study. ANIMALS: Healthy adult female client-owned cats. METHODS: Sixty-four cats weighing 3.15 +/- 0.6 kg, presented to the University of Helsinki's Small Animal Teaching Hospital for routine elective ovariohysterectomy, received MED at 15 microg/kg (n = 18), BTO at 0.1 mg/kg (n = 23), or saline (PL) (n = 23) intramuscularly immediately after ovariohysterectomy. Level of pain perception, degree of restlessness, and extent of sedation were scored subjectively before and at 30, 60, 90, and 120 minutes after test-drug administration. RESULTS: BTO provided the best pain relief, followed by MED. Saline provided the least pain relief. Both MED and BTO effectively and identically prevented postoperative restlessness. MED and BTO produced an identical degree of sedation that was better than the PL. CONCLUSIONS: Both MED (at 15 microg/kg) and BTO (at 0.1 mg/kg) prevent postoperative pain in cats after ovariohysterectomy. Clinical Relevance-MED and BTO are useful for preventing postoperative pain in cats.

Descriptors: nonnarcotic analgesics, opioid analgesics, animals, butorphanol, cats, hysterectomy, veterinary, intramuscular injections, medetomidine, pain measurement, postoperative pain.

Balmer, T.V., D. Irvine, R.S. Jones, M.J. Roberts, L. Slingsby, P.M. Taylor, A.E. Waterman, and C. Waters (1998). **Comparison of carprofen and pethidine as postoperative analgesics in the cat.** *The Journal of Small Animal Practice* 39(4): 158-164. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: The postoperative analgesia and sedation in cats given carprofen (4.0 mg/kg bodyweight by subcutaneous injection preoperatively) was compared to that in cats given

pethidine (3.3 mg/kg bodyweight by intramuscular injection postoperatively) in a controlled, randomised, blinded, multicentre clinical trial. Further dosing with the particular analgesic was allowed if a cat was exhibiting unacceptable pain. In total, 57 carprofen cases and 59 pethidine cases were evaluated. Significantly fewer cats in the carprofen group required additional doses of analgesic, and mean pain scores were significantly lower from four hours after ovariohysterectomy, and at 18 to 24 hours after castration, compared to the pethidine group. In conclusion, carprofen provided as good a level of postoperative analgesia as pethidine, but of a longer duration (at least 24 hours) and was well tolerated. It thus provides an option for 'pre-emptive analgesia' in cats about to undergo surgery.

Descriptors: opioid analgesics, anti-inflammatory agents, carbazoles, cats, comparative study, hysterectomy, veterinary, injections, meperidine, orchiectomy, ovariectomy, pain measurement, prevention and control of postoperative pain, premedication.

Bednarski, R.M., L.S. Bednarski, and W.W.3. Muir (1984). **Cost comparison of anesthetic regimens in the dog and cat.** *Journal of the American Veterinary Medical Association* 185(8): 869-872. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Comparative costs of anesthetic regimens for the dog and cat were calculated. Various combinations of currently popular sedatives, tranquilizers, and anti-muscarinics (preanesthetic drugs), and anesthetic induction and maintenance drugs were studied. The preanesthetic drug affected overall anesthetic cost through its own cost, its effect on the amount of anesthetic drug necessary for intubation, and its effect on the amount of anesthetic necessary to maintain anesthesia. The combination of acetylpromazine-thiamylal-halothane was the least expensive regimen for both the dog and cat, whereas drug combinations that included isoflurane as the maintenance drug were the most expensive. In the cat, induction of anesthesia by use of N₂O, O₂, and halothane in a plexiglas chamber was more expensive than by the use of thiamylal.

Descriptors: anesthesia, animal, castration, cats, comparative study, costs and cost analysis, dogs, hysterectomy, preanesthetic medication.

Bednarski, R.M. and W.W. Muir 3rd (1991). **Closed system delivery of halothane and isoflurane with a vaporizer in the anesthetic circle.** *Veterinary Surgery* 20(5): 353-356. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: Forty-four healthy dogs undergoing elective ovariohysterectomy were anesthetized with halothane or isoflurane delivered with an in-circuit vaporizer with closed system flow rates or an out-of-circuit vaporizer with semi-closed system flow rates. When dogs were anesthetized with halothane, there were no differences in heart rate, blood pressure, body temperature, respiratory rate, or lingual venous pH, PCO₂, or PO₂ during induction and maintenance. Lingual venous PO₂ was significantly less but still within a clinically acceptable range when isoflurane was used in an in-circuit vaporizer. Recovery times tended to be longer with in-circuit vaporizers. The amount of anesthetic used was not affected by vaporizer location. In-circuit vaporizers were suitable for delivery of halothane or isoflurane to healthy dogs.

Descriptors: acepromazine, aerosols, inhalation anesthesia, dogs, halothane, heart rate, hysterectomy, isoflurane, nebulizers and vaporizers, ovariectomy, respiration.

Benson, G.J., T.L. Grubb, C. Neff-Davis, W.A. Olson, J.C. Thurmon, D.L. Lindner, W.J. Tranquilli, and O. Vanio (2000). **Perioperative stress response in the dog: effect of pre-emptive administration of medetomidine.** *Veterinary Surgery* 29(1): 85-91. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVE: To determine the effect of medetomidine on the stress response induced by ovariohysterectomy in isoflurane-anesthetized dogs. STUDY DESIGN: Prospective randomized study. ANIMALS: Twelve healthy adult female purpose-bred dogs, weighing 16.8 to 25 kg. METHODS: Two treatments were randomly administered to each of twelve dogs at weekly intervals: (1) Saline injected IM followed in 15 minutes by isoflurane anesthesia (ISO) induced by mask and maintained at an end-tidal concentration of 1.8% for 60 minutes; and (2) Medetomidine, 15 ug/lkg IM followed in 15 minutes by isoflurane anesthesia (ISO&MED) induced by mask and maintained at an end-tidal concentration of 1.0% for 60 minutes. One week after completion of these two treatments, all dogs were ovariohysterectomized. six receiving each treatment (SURG and SURG&MED). Central venous blood samples (10 mL) were obtained immediately before medetomidine or saline (baseline) and at 30, 75, and 195 minutes and 24 hours after administration of medetomidine or saline in ISO and ISO&MED. In SURG and SURG&MED, samples were obtained immediately prior to injection of medetomidine or saline (baseline) and at 30 (before skin incision), 45 (after severance of the ovarian ligament), 75 (after skin closure), 105 (30 minutes after skin closure, dog recovered and in sternal recumbency), 135, 195, 375 minutes, and 24 hours after the initial sample. Samples were analyzed for epinephrine, norepinephrine, adrenocorticotrophic hormone (ACTH), cortisol, insulin, and glucose. Data were analyzed by analysis of variance and where significant differences were found, a least significant difference test was applied. RESULTS: Premedication with medetomidine prevented or delayed the stress response induced by ovariohysterectomy in isoflurane-anesthetized dogs. CONCLUSIONS: The stress response induced by ovariohysterectomy, although significant, is of short duration. Medetomidine safely and effectively reduced surgically-induced stress responses. CLINICAL RELEVANCE: Surgically induced stress responses can be obtunded or prevented by administration of medetomidine.

Descriptors: inhalation anesthetics, animals, corticotropin, dogs, epinephrine, hypnotics and sedatives, hysterectomy, intramuscular injections, isoflurane, medetomidine, ovariectomy, prevention and control of stress.

Brennan, T.J. (1999). **Postoperative models of nociception.** *ILAR Journal* 40(3): 129-136. ISSN: 1084-2020.

NAL Call Number: QL55.A1143

Abstract: Even though it is a costly, poorly understood problem, very little effort has been dedicated toward research on the mechanisms of acute postoperative pain. Presumably, if we learn more about the etiology of acute incisional pain and the sensory processes that intensify pain after surgery, new treatment methods can be advanced. Since the mid-1990s, our group and others have developed and characterized models for postoperative pain. In one model, a

hind paw plantar incision is made. Persistent reduced withdrawal thresholds to mechanical stimuli suggesting hyperalgesia are present. No tonic or spontaneous pain is apparent, but diminished weight bearing is noted on the incised hind paw. Pain-related behaviors remain remarkable for several days and then gradually decrease. The model therefore has similarities to the time course for pain in postoperative patients. Ovariohysterectomy, a clinically relevant procedure, has been used to study postoperative pain. Both rat and dog models have been studied, and a variety of pain-related behaviors including pain at rest and wound sensitivity have been examined. These models will improve our understanding of unique pain mechanisms caused by particular injuries. As we understand postoperative pain and determine the unique mechanisms for acute tissue injury pain, better treatments will evolve and perioperative morbidity will decrease.

Descriptors: postoperative pain, models, sensory processes, plantar incision, ovariohysterectomy, dog, rat, wound sensitivity, pain related behaviors.

Campbell, V.L., K.J. Drobatz, and S.Z. Perkowski (2003). **Postoperative hypoxemia and hypercarbia in healthy dogs undergoing routine ovariohysterectomy or castration and receiving butorphanol or hydromorphone for analgesia.** *Journal of the American Veterinary Medical Association* 222(3): 330-336. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine frequency and severity of postanesthetic hypoxemia and hypercarbia in healthy dogs undergoing elective ovariohysterectomy or castration and given butorphanol or hydromorphone for analgesia. DESIGN: Prospective trial. ANIMALS: 0 healthy dogs weighing > 10 kg (22 lb). PROCEDURE: Dogs were anesthetized with acepromazine, glycopyrrolate, thiopental, and isoflurane, and butorphanol (n = 10) or hydromorphone (10) was used for perioperative analgesia. Arterial blood gas analyses were performed 10 and 30 minutes and 1, 2, 3, and 4 hours after extubation. RESULTS: In dogs that received hydromorphone, mean PaCO₂ was significantly higher, compared with the preoperative value, 10 and 30 minutes and 1, 2, and 3 hours after extubation. Mean PaCO₂ was significantly higher in dogs given hydromorphone rather than butorphanol 10 and 30 minutes and 1 and 2 hours after extubation. Mean PaO₂ was significantly lower, compared with preoperative values, 30 minutes and 1 and 2 hours after extubation in dogs given hydromorphone and 30 minutes after extubation in dogs given butorphanol. Mean PaO₂ was significantly lower in dogs given hydromorphone rather than butorphanol 1 hour after extubation. Four dogs had PaO₂ < 80 mm Hg 1 or more times after extubation. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggest that administration of hydromorphone to healthy dogs undergoing elective ovariohysterectomy or castration may result in transient increases in PaCO₂ postoperatively and that administration of hydromorphone or butorphanol may result in transient decreases in PaO₂. However, increases in PaCO₂ and decreases in PaO₂ were mild, and mean PaCO₂ and PaO₂ remained within reference limits.

Descriptors: analgesics, anoxemia, butorphanol, hydromorphone, hypercapnia, postoperative complications, blood gas analysis, dogs, hysterectomy, orchiectomy, ovariectomy, adverse effects.

Caulkett, N., M. Read, D. Fowler, and C. Waldner (2003). **A comparison of the analgesic effects of butorphanol with those of meloxicam after elective ovariohysterectomy in dogs.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 44(7): 565-570. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Abstract: This study was designed to compare the analgesic effects of butorphanol with those of meloxicam following ovariohysterectomy. Fifteen dogs were premedicated with 0.05 mg/kg body weight (BW) of acepromazine by intramuscular (IM) injection, plus 0.2 mg/kg BW of meloxicam by subcutaneous (SC) injection. Fifteen dogs were premedicated with 0.05 mg/kg BW of Acepromazine, IM, plus 0.2 mg/kg BW of butorphanol, IM. Anesthesia was induced with thiopental, and dogs were maintained on halothane. All pain measurements were performed by 1 experienced individual, blinded to treatment. Pain scores and visual analogue scales (VAS) were performed at 2, 3, 4, 6, 8, 12, and 24 hours postpremedication. An analgesiometer was used to determine the pressure required to produce an active avoidance response to pressure applied at the incision line. Pain scores, VAS, and analgesiometer scores were analyzed by using a generalized estimating equations method. A significance level of $P < 0.05$ was considered significant. Animals that received meloxicam demonstrated significantly lower pain scores and VAS than did animals that received butorphanol in the first 12 hours after surgery. Results of this study suggest that meloxicam will produce better postoperative analgesia than will butorphanol. Mucosal bleeding times were performed on cooperative animals in the study group (11 butorphanol, 13 meloxicam). Bleeding times were performed prior to premedication, 6 hours following premedication, and 24 hours after premedication. The 6- and 24-hour readings were compared with baseline bleeding times by using a paired t-test with a Bonferroni correction (a significance level of $P < 0.025$). Bleeding times did not change significantly over time.

Descriptors: analgesics, butorphanol, ovariectomy, hysterectomy, pain measurement, postoperative pain, dogs, meloxicam.

Dobbins, S., N.O. Brown, and F.S. Shofer (2002). **Comparison of the effects of buprenorphine, oxymorphone hydrochloride, and ketoprofen for postoperative analgesia after onychectomy or onychectomy and sterilization in cats.** *Journal of the American Animal Hospital Association* 38(6): 507-514. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Abstract: In this prospective, randomized, blinded study, 68 clinically healthy cats that had onychectomy ($n = 20$), onychectomy and castration ($n = 20$), or onychectomy and ovariohysterectomy ($n = 28$) were randomly assigned to one of four postoperative analgesic treatment groups: buprenorphine (0.01 mg/kg body weight, intramuscularly [IM]), oxymorphone hydrochloride (0.05 mg/kg body weight, IM), ketoprofen (2 mg/kg body weight, IM), and placebo (physiological saline). Sedation scores, visual analog pain scores, cumulative pain scores, serum cortisol concentration, and appetite were used to assess postoperative analgesic effect. Buprenorphine demonstrated the highest efficacy with the lowest cumulative pain scores and serum cortisol levels.

Descriptors: opioid analgesics, buprenorphine, castration, cats, postoperative pain, pain measurement.

Dobromylskyj, P. (1996). **Cardiovascular changes associated with anaesthesia induced by medetomidine combined with ketamine in cats.** *The Journal of Small Animal Practice* 37(4): 169-172. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: Fifteen cats had anaesthesia induced by intramuscular injection of medetomidine combined with ketamine. By five minutes after drug administration, heart rate had decreased by 31 per cent, respiratory rate had decreased by 70 per cent and systolic blood pressure had increased by 69 per cent. Atipamezole administration was associated with a decrease in systolic blood pressure and an increase in heart and respiratory rates. Time to first head lift was eight minutes and to sternal recumbency 12 minutes after atipamezole administration. Postoperative analgesia was provided by methadone, administered when the cats adopted sternal recumbency.

Descriptors: anesthesia, dissociative anesthetics, castration, blood pressure, cats, heart rate, drug combinations, hemodynamics, imidazoles, ketamine, medetomidine.

Dohoo, S.E. and I.R. Dohoo (1996). **Factors influencing the postoperative use of analgesics in dogs and cats by Canadian veterinarians.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 37(9): 552-556. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Abstract: Four hundred and seventeen Canadian veterinarians were surveyed to determine their postoperative use of analgesics in dogs and cats following 6 categories of surgeries, and their opinion toward pain perception and perceived complications associated with the postoperative use of potent opioid analgesics. Three hundred and seventeen (76%) returned the questionnaire. An analgesic user was defined as a veterinarian who administers analgesics to at least 50% of dogs or 50% of cats following abdominal surgery, excluding ovariohysterectomy. The veterinarians responding exhibited a bimodal distribution of analgesic use, with 49.5% being defined as analgesic users. These veterinarians tended to use analgesics in 100% of animals following abdominal surgery. Veterinarians defined as analgesic nonusers rarely used postoperative analgesics following any abdominal surgery. Pain perception was defined as the average of pain rankings (on a scale of 1 to 10) following abdominal surgery, or the value for dogs or cats if the veterinarian worked with only 1 of the 2 species. Maximum concern about the risks associated with the postoperative use of potent opioid agonists was defined as the highest ranking assigned to any of the 7 risks evaluated in either dogs or cats. Logistic regression analysis identified the pain perception score and the maximum concern regarding the use of potent opioid agonists in the postoperative period as the 2 factors that distinguished analgesic users from analgesic nonusers. This model correctly classified 68% of veterinarians as analgesic users or nonusers. Linear regression analysis identified gender and the presence of an animal health technologist in the practice as the 2 factors that influenced pain perception by veterinarians. Linear regression analysis identified working with an animal health technologist, graduation within the past 10 years, and attendance at continuing education as factors that influenced maximum concern about the postoperative use of opioid agonists.

Descriptors: abdominal surgery, analgesics, cats, dogs, continuing medical education, pain measurement, postoperative pain, questionnaires.

Dohoo, S.E. and I.R. Dohoo (1996). **Postoperative use of analgesics in dogs and cats by Canadian veterinarians.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 37(9): 546-551. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: postoperative use of analgesics, cats, dogs, pain perception, orthopaedic surgery, castration, opioid analgesics, butorphanol, complications related to analgesics, survey, opinions of veterinarians, Canada.

Egger, C.M., L.E. Glerum, S.W. Allen, and M. Haag (2003). **Plasma fentanyl concentrations in awake cats and cats undergoing anesthesia and ovariohysterectomy using transdermal administration.** *Veterinary Anaesthesia and Analgesia* 30(4): 229-236. ISSN: 1467-2987.

NAL Call Number: SF914.V47

Abstract: **OBJECTIVE:** To measure the plasma fentanyl concentrations achieved over time with transdermal fentanyl patches in awake cats and cats undergoing anesthesia and ovariohysterectomy. **STUDY DESIGN:** Randomized prospective experimental study. **ANIMALS:** Twenty-four purpose-bred cats. **METHODS:** Cats were randomly assigned to three groups for Part I of a larger concurrent study. Group P received only a 25 micro g hour⁻¹ transdermal fentanyl patch. Group P/A received the patch and anesthesia. Group A received only anesthesia. After a minimum 1-week washout period, the cats were randomly reassigned to two groups for Part II of the larger study. Group P/A/O received the patch, anesthesia and ovariohysterectomy. Group A/O received anesthesia and ovariohysterectomy. Patches were left in place for 72 hours and plasma samples were obtained for fentanyl analysis while the patches were in place, and for 8 hours after patch removal for cats in Group P, P/A, and P/A/O. **RESULTS:** The 25 micro g hour⁻¹ transdermal fentanyl patches were well tolerated by the cats in this study (mean body weight of 3.0 kg) and no overt adverse effects were noted. Mean plasma fentanyl concentrations over time, mean plasma fentanyl concentrations at specific times (8, 25, 49, and 73 hours after patch placement), time to first detectable plasma fentanyl concentration, time to reach maximum plasma fentanyl concentration, maximum plasma fentanyl concentration, mean plasma fentanyl concentration from 8 to 73 hours, elimination half-life, and total area under concentration (AUC) were not statistically different among the groups. **CONCLUSIONS:** Halothane anesthesia and anesthesia/ ovariohysterectomy did not significantly alter the plasma fentanyl concentrations achieved or pharmacokinetic parameters measured, when compared with awake cats. There was a high degree of individual variability observed both within and between groups of cats in parameters measured. **CLINICAL SIGNIFICANCE:** The high degree of variability observed suggests that careful observation of cats with fentanyl patches in place is required to assess efficacy and any potential adverse effects. Anesthesia and anesthesia/ ovariohysterectomy do not appear to alter plasma fentanyl concentrations achieved by placement of a 25 micro g hour⁻¹ transdermal fentanyl patch when compared to cats not undergoing these procedures. **Descriptors:** opioid analgesics, anesthesia, behavior, cats, fentanyl, ovarietomy, prevention and control of pain, pain measurement.

Faggella, A.M. and M.G. Aronsohn (1993). **Anesthetic techniques for neutering 6- to 14-week-old kittens.** *Journal of the American Veterinary Medical Association* 202(1): 56-62. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Forty-eight male and 48 female 6- to 14-week-old kittens were neutered by use of 4 anesthetic protocols. Preanesthetic disposition, depth of sedation, loss of resistance to handling, induction quality, induction time, sternal and stand times, and recovery quality were evaluated. Analgesia and muscle relaxation without supplemental inhalational anesthetics were evaluated in male kittens, and the time until extubation was recorded in female kittens. Intramuscular administration of tiletamine/zolazepam (TZ), midazolam/ketamine, atropine/midazolam/ketamine/butorphanol (AMKB), and atropine/midazolam/ketamine/oxymorphone (AMKO) produced rapid sedation and smooth induction into anesthesia. In male kittens, there were no significant differences in sedation, relaxation, induction time, or quality. Tiletamine/zolazepam administration induced the best analgesia, and midazolam/ketamine administration induced the least analgesia for castration. The recovery time in male kittens was longest with TZ and shortest with the opioid groups (AMKB, AMKO). In females, TZ produced significantly faster induction times, but the degree of sedation and relaxation after administration of injectable agents was not significantly different among the groups. More females given TZ could be intubated without supplemental inhalational agents than females in other groups. Extubation time was rapid in all groups, but the times until sternal and standing were significantly longer, and recovery quality was significantly poorer in females given TZ. In kittens given opioids, reversal of the opioid did not shorten recovery time or improve recovery quality.

Descriptors: analgesia, anesthesia, butorphanol, castration, cats, drug combinations, drug effects on heart rate and respiration, ketamine, midazolam, oxymorphone, preanesthetic medication, tiletamine, zolazepam.

Faggella, A.M. and M.G. Aronsohn (1994). **Evaluation of anesthetic protocols for neutering 6- to 14-week-old pups.** *Journal of the American Veterinary Medical Association* 205(2): 308-14. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Ninety-nine 6- to 14-week-old pups were given anesthetic agents according to 10 anesthetic protocols. Mean quality rating scores were determined to compare anesthetic protocols. In male pups, IV administration of propofol (6.5 mg/kg of body weight) 15 minutes after IM administration of atropine (0.04 mg/kg) and oxymorphone (0.22 mg/kg) provided the best quality anesthesia. Intramuscular administration of midazolam (0.22 mg/kg) and butorphanol (0.44 mg/kg) instead of oxymorphone provided little sedation, but induced good analgesia. Atropine/oxymorphone/midazolam/xylazine, atropine/butorphanol/midazolam/xylazine, and tiletamine/zolazepam were unsatisfactory combinations for use in castration of 6- to 14-week-old male pups. In female pups, IV administration of propofol (3.4 mg/kg) 15 minutes after IM administration of atropine (0.04 mg/kg) and oxymorphone (0.11 mg/kg) was the most effective anesthetic protocol. Administration of the drugs according to this protocol enabled a pup to be intubated. Anesthesia was maintained with isoflurane in oxygen. If inhalational induction was preferred, IM administration of 13.2 mg of tiletamine/zolazepam/kg, 0.04 mg of atropine/kg and 0.11 mg of oxymorphone/kg, or 0.22 mg of midazolam/kg and 0.44 mg of butorphanol/kg may be used prior to mask delivery of inhalational anesthetics. In female pups, it was not advantageous to combine midazolam with oxymorphone, and use of high dosages of oxymorphone (0.22 mg/kg) or

midazolam/butorphanol provided little sedation. Time of recovery after use of tiletamine/zolazepam was the longest for the combinations used, but did not adversely affect pups. Male pups were castrated via scrotal incisions, using hemostatic clips. Ovariohysterectomies were performed via a ventral abdominal midline approach, using hemostatic clips for ligation, five females developed signs of inflammation at the surgical site within 1 to 2 weeks after surgical, and were treated conservatively with warm compresses.

Descriptors: anesthesia, dogs, hysterectomy, orchiectomy, ovariectomy, analgesia, adverse effects of anesthetics, muscle relaxation, postoperative complications.

Firth, A.M. and S.L. Haldane (1999). **Development of a scale to evaluate postoperative pain in dogs.** *Journal of the American Veterinary Medical Association* 214(5): 651-659. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To design and evaluate a scale for measurement of postoperative pain in dogs. DESIGN: Randomized, blinded, prospective study, with positive- and negative-control groups. ANIMALS: 36 dogs undergoing general anesthesia for ovariohysterectomy and 12 dogs undergoing general anesthesia without surgery. PROCEDURE: A pain assessment scale was developed for dogs, which incorporated physiologic data (heart and respiratory rates) and behavioral responses (response to palpation, activity, mental status, posture, and vocalization). This pain scale was then applied to a study in which dogs were allocated to 2 groups, depending on the type of medication administered (acepromazine maleate only or acepromazine and butorphanol) before induction of general anesthesia. The 36 dogs that had ovariohysterectomy were allocated to 3 groups, members of which received butorphanol, carprofen, or no analgesic after surgery. Dogs were scored for signs of pain and videotaped at 0, 1, 2, 4, 6, 8, 12, and 18 hours after surgery by an assessor who was blinded to the groups. Results were analyzed for significant differences in pain scores for single categories and total pain scores among groups. Video segments were scrambled and then scored by a second external assessor to test the repeatability of the results, using the pain assessment scale. RESULTS: Mean total pain scores were significantly different between the group of dogs that underwent general anesthesia only and each group of dogs that underwent general anesthesia and surgery. Pain scores for the analgesic-treatment groups reflected the known onset and duration of action of the analgesic used. Agreement between the internal and external assessors was excellent and indicated high precision between the 2 assessors for the population of dogs as a whole. CLINICAL IMPLICATIONS: Behavioral and physiologic measurements can be used reliably to evaluate degree of pain in dogs during the postoperative period and their response to analgesics.

Descriptors: postoperative pain, pain measurement, ovariohysterectomy, anesthesia, pain scale, behavioral measures, physiological measures, dogs, heart rate, respiration, posture, vocalization, activity level.

Forsyth, S.F., W.G. Guilford, and D.U. Pfeiffer (2000). **Effect of NSAID administration on creatinine clearance in healthy dogs undergoing anaesthesia and surgery.** *The Journal of Small Animal Practice* 41(12): 547-550. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: dogs, nonsteroidal antiinflammatory agents, ketoprofen, creatinine, glomerular filtration rate, anesthesia, surgery, hemorrhage, castration.

Fox, S.M., D.J. Mellor, E.C. Firth, H. Hodge, and C.R. Lawoko (1994). **Changes in plasma cortisol concentrations before, during and after analgesia, anaesthesia and anaesthesia plus ovariohysterectomy in bitches.** *Research in Veterinary Science* 57(1): 110-118. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: Plasma cortisol concentrations were determined before, during and after analgesia, anaesthesia and anaesthesia plus ovariohysterectomy in six New Zealand border collie cross bitches. The treatments were: control, analgesia with butorphanol, anaesthesia with thio-pentone sodium, halothane and oxygen and anaesthesia plus surgery. In addition, each bitch was given an ACTH challenge. All the bitches showed transient increases in plasma cortisol concentrations and the integrated cortisol responses (calculated as the area under the cortisol curve above the pre-treatment concentration) for 6.25 hours after treatment increased in the order: control, anaesthesia, analgesia, surgery. The control group had increased cortisol concentrations attributable to the excitement from handling. The plasma cortisol concentrations of the group subjected to surgery were greater than the other groups for at least 6.25 hours, with an approximately four-fold increase above pre-treatment values, but they had returned to pre-treatment levels after 24 hours.

Descriptors: analgesia, anesthesia, dogs, blood, hydrocortisone, hysterectomy, ovariectomy.

Fox, S.M., D.J. Mellor, C.R. Lawoko, H. Hodge, and E.C. Firth (1998). **Changes in plasma cortisol concentrations in bitches in response to different combinations of halothane and butorphanol, with or without ovariohysterectomy.** *Research in Veterinary Science* 65(2): 125-133. ISSN: 0034-5288.

DOI: [10.1016/S0034-5288\(98\)90163-1](https://doi.org/10.1016/S0034-5288(98)90163-1)

NAL Call Number: 41.8 R312

Abstract: Changes in plasma cortisol concentrations were assessed in bitches in response to nine treatments: control, anaesthesia, analgesia, analgesia followed by anaesthesia, anaesthesia followed by analgesia at intubation, anaesthesia followed by analgesia at extubation, anaesthesia plus surgery, analgesia followed by anaesthesia plus surgery, and anaesthesia plus surgery followed by analgesia. The anaesthetic was halothane, the analgesic was butorphanol (0.4 mg kg⁻¹) and the surgery was ovariohysterectomy. Blood samples, for plasma cortisol assays, were taken regularly from before treatment for five hours and then again after 24 hours. A small transient rise in plasma cortisol concentration in the control group was attributed to mild distress associated with novel experiences. A more pronounced and protracted rise in cortisol concentration in the analgesia group was ascribed to a dysphoric state of bitches under the influence of the agonist-antagonist butorphanol. Halothane anaesthesia alone resulted in no change in plasma cortisol concentration. When butorphanol was given after anaesthesia was induced or while the animal was still under the influence of anaesthesia (immediately after tracheal extubation), there was no immediate rise in plasma cortisol concentration and low concentrations were maintained for up to 60 minutes after halothane withdrawal. A marked rise in plasma cortisol concentration, which was sustained above pre-treatment values for at least five hours, occurred in all surgery groups. Giving intravenous

butorphanol 30 minutes prior to surgery had no effect on the surgically-induced rise in plasma cortisol concentration and no effect on the postsurgical plasma cortisol concentration. In contrast, butorphanol given at extubation did reduce plasma cortisol concentrations during the postsurgical period. These observations did not support the hypothesis that preoperative use of butorphanol would reduce the cortisol response after surgery under halothane anaesthesia.

Descriptors: analgesia, anesthesia, animal, butorphanol, dogs, female, halothane, hydrocortisone, hysterectomy, kinetics, ovariectomy.

Franks, J.N., H.W. Boothe, L. Taylor, S. Geller, G.L. Carroll, V. Cracas, and D.M. Boothe (2000).

Evaluation of transdermal fentanyl patches for analgesia in cats undergoing onychectomy. *Journal of the American Veterinary Medical Association* 217(7): 1013-1018. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: surgery complications, castration, onychectomy, ovariohysterectomy, heart rate, pain severity, respiratory rate.

Gaynor, J.S., E.M. Wertz, L.M. Kesel, G.E. Baker, C. Cecchini, K. Rice, and C.M. Mallinckrodt

(1996). **Effect of intravenous administration of fluids on packed cell volume, blood pressure, and total protein and blood glucose concentrations in healthy halothane-anesthetized dogs.** *Journal of the American Veterinary Medical Association* 208(12): 2013-2015. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE--To determine the effects of IV administration of fluids on PCV, serum total protein and blood glucose concentrations, and systolic arterial pressure in healthy anesthetized dogs undergoing elective surgical procedures. DESIGN--Prospective, randomized controlled trial. ANIMALS--70 clinically normal dogs. PROCEDURE--Dogs received i.v. administration of 0, 5, 10, or 15 mL/kg of body weight/h of a polyionic crystalloid solution or 5% dextrose in water. Blood samples were collected before and after administration of medication, prior to anesthetic induction, after anesthetic induction, at the end of the surgical procedure, and 2 hours after surgery to determine PCV and serum total protein and blood glucose concentrations. Blood pressure was measured before and after anesthetic induction and at the end of the surgery. RESULTS--There were not any significant differences in PCV, total protein concentration, or systolic arterial pressure among treatment groups. Hyperglycemia developed in dogs receiving 5% dextrose in water, but resolved 2 hours after discontinuing administration of fluids. CLINICAL IMPLICATIONS--Intravenous administration of fluids may not be necessary to maintain normal blood pressure in young, healthy dogs undergoing elective surgery.

Descriptors: inhalation anesthetics, blood glucose, blood pressure, dogs, halothane, fluid therapy, hysterectomy, ovariectomy, orchiectomy.

Glerum, L.E., C.M. Egger, S.W. Allen, and M. Haag (2001). **Analgesic effect of the transdermal fentanyl patch during and after feline ovariohysterectomy.** *Veterinary Surgery* 30(4): 351-358. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVE: To evaluate the efficacy of the transdermal fentanyl patch in relieving perioperative pain and stress associated with ovariohysterectomy in cats. STUDY DESIGN: Prospective laboratory trial. ANIMALS: Twenty-four female, purpose-bred cats. METHODS: Each cat was randomly assigned to groups 1-3. Group 1 received a 25-microg/h transdermal fentanyl patch only. Group 2 received the patch and anesthesia. Group 3 received anesthesia only. Patches were left in place for 72 hours. Rectal temperature, heart rate, respiratory rate, indirect blood pressure, blood glucose, serum cortisol concentration, plasma fentanyl concentration, pain score, and excitement/sedation score were monitored at prescribed intervals over an 81-hour period. Cats from groups 1-3 were re-assigned to groups 4 and 5. Group 4 received the patch, anesthesia, and an ovariohysterectomy. Group 5 received anesthesia and an ovariohysterectomy only. The study period and monitored parameters were the same as for groups 1-3. RESULTS: Serum cortisol concentrations were significantly lower in group 4 than group 5 during the surgical and early postsurgical time periods. A similar effect was noted in blood glucose concentrations during the surgical period. Rectal temperature was significantly higher in group 2 when comparing all anesthetized groups during the early postsurgical period. Pain scores were significantly higher in groups 4 and 5 than in groups 2 and 3 during the early postsurgical period. There was no significant difference in pain scores between groups 4 and 5 during this period, however. CONCLUSIONS: The transdermal fentanyl patch affects biochemical markers of perioperative pain and stress associated with ovariohysterectomy in cats, attenuating rises in serum cortisol and blood glucose concentrations during the surgical and early postsurgical periods. CLINICAL RELEVANCE: The transdermal fentanyl patch is effective in alleviating perioperative pain and stress associated with ovariohysterectomy in cats as evidenced by attenuated rises in cortisol and blood glucose concentrations in cats that were operated on and treated with the patch.

Descriptors: analgesics, fentanyl patch, pain and stress, ovariohysterectomy, cats, cortisol levels, blood glucose concentrations, pain management.

Grandy, I. and C. Dunlop (1991). **Anesthesia of pups and kittens.** *Journal of the American Veterinary Medical Association* 198(7): 1244-1249. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: pups, kittens, anesthesia, anesthetics, age differences, pharmacokinetics, respiratory system, cardiovascular system, liver, kidneys, thermoregulation.

Greene, S.A. (1995). **Anesthetic considerations for surgery of the reproductive system.** *Seminars in Veterinary Medicine and Surgery (Small Animal)* 10(1): 2-7. ISSN: 0882-0511.

NAL Call Number: SF911.S45

Descriptors: anesthesia, cats, cesarean section, dogs, hemodynamic processes, lung physiology, orchietomy, ovariectomy, pregnancy, female, male.

Grimm, K.A., J.C. Thurmon, W.A. Olson, W.J. Tranquilli, and G.J. Benson (1998). **The pharmacodynamics of thiopental, medetomidine, butorphanol and atropine in beagle dogs.** *Journal Of Veterinary Pharmacology And Therapeutics* 21(2): 133-137. ISSN: 0140-7783.

NAL Call Number: SF915.J63

Descriptors: anesthesia, hemodynamic effects, castration, blood pressure, dogs, medetomidine, thiopental, butorphanol, atropine.

Hall, L.W., E. Lagerweij, A.M. Nolan, and J.W. Sear (1994). **Effect of medetomidine on the pharmacokinetics of propofol in dogs.** *American Journal Of Veterinary Research* 55(1): 116-120. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: Pharmacokinetic variables of propofol were investigated in 6 mixed-breed dogs, and the effect of medetomidine (10 micrograms/kg of body weight) on these kinetics was investigated using a two-way crossover design. On 2 occasions, dogs received either a bolus dose of propofol sufficient to allow endotracheal intubation, followed by an infusion of propofol (0.4 mg/kg/min) for 120 minutes, or medetomidine (10 micrograms/kg, IM), 15 minutes prior to induction of anesthesia as described, followed by infusion of propofol (0.2 mg/kg/min). Dogs given medetomidine received atipamezole (50 micrograms/kg, IM) at the end of the 120-minute propofol infusion. Blood propofol concentration was measured, using high-performance liquid chromatography with fluorescence detection. Mean elimination half-life, blood clearance, mean residence time, and mean volume of distribution at steady state, were 486.2 minutes, 34.4 ml/kg/min, 301.8 minutes, and 6.04 L/kg, respectively, in the absence of medetomidine, and 136.9 minutes, 36.2 ml/kg/min, 215.1 minutes, and 3.38 L/kg, respectively, in the presence of medetomidine. Mean time to walking without ataxia was 174 minutes in the nonpremedicated dogs (with a median blood propofol concentration of 2.2 micrograms/ml) and was 160 minutes in the premedicated dogs in which median blood propofol concentration was 1.03 microgram/ml.

Descriptors: adrenergic alpha-antagonists, comparative study, dogs, imidazoles, medetomidine, metabolic clearance rate, motor activity, orchiectomy, ovariectomy, propofol.

Hellebrekers, L.J. and N. Reens (1993). **Castreren van katers. [Castration of male cats].** *Tijdschrift Voor Diergeneeskunde* 118(9): 314-315. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: anesthesia, castration, cats, adverse effects of anesthesia, myocardium metabolism, oxygen consumption, drug effects.

Language of Text: Dutch.

Hellebrekers, L.J. and R. Sap (1997). **Medetomidine as a premedicant for ketamine, propofol or fentanyl anaesthesia in dogs.** *The Veterinary Record* 140(21): 545-548. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: This study evaluated the quality of anaesthesia and the cardiorespiratory effects induced by the combination of medetomidine with either ketamine, propofol or fentanyl. Medetomidine premedication (1000 or 1500 micrograms/m² body surface area) was followed by intravenous induction of anaesthesia with ketamine (3.0 mg/kg), propofol (2.0 mg/kg) or fentanyl (2.0 micrograms/kg) in bitches undergoing elective ovariohysterectomy. Anaesthesia was prolonged by incremental doses of the induction agents as necessary. The mean (sem) overall doses (including induction) were 0.09 (0.01) mg/kg/min for ketamine, 0.06 (0.01) mg/kg/min for propofol and 0.07 (0.005) microgram/kg/min for fentanyl during procedures which lasted 88 (6) minutes, 72 (3) minutes and 79 (7) minutes, respectively. At

the end of the procedure, medetomidine was antagonised with atipamezole. The quality of anaesthesia, heart rate and arterial blood pressure were recorded continuously and arterial blood gases were measured at intervals. At the end of the procedure, the animals received 10 micrograms/kg buprenorphine intramuscularly for postoperative analgesia. From the adequacy of anaesthesia, the lack of significant adverse side effects and the reliable and rapid recovery it is concluded that, in healthy dogs anaesthetised with ketamine or propofol, medetomidine is a satisfactory sedative-analgesic premedicant. The differences in haemodynamics and the quality of recovery suggest that the combination of medetomidine with propofol provided the better quality anaesthesia. The combination of medetomidine with fentanyl was unsuitable for obtaining surgical anaesthesia in spontaneously breathing animals owing to the severity of the respiratory depression at dosages needed for general anaesthesia. **Descriptors:** adrenergic alpha-agonists, dissociative anesthetics, dogs, drug administration schedule, fentanyl, hemodynamics, imidazoles, ketamine, medetomidine, ovariectomy, pre-anesthetic medication, propofol.

Hughes, J.M. (1998). **Comparison of disposable circle and 'to-and-fro' breathing systems during anaesthesia in dogs.** *The Journal of Small Animal Practice* 39(9): 416-420. ISSN: 0022-4510. **NAL Call Number:** 41.8 J8292

Abstract: Low-flow anaesthesia is beneficial in terms of reducing atmospheric pollution with waste anaesthetics and improving economy. This study compared a disposable circle and a 'to-and-fro' breathing system at low fresh gas flows (10 ml/kg/minute) in 19 dogs undergoing ovariohysterectomy. Ten dogs were assigned to the circle and nine to the to-and-fro breathing system. Fractional inspired halothane, end-tidal carbon dioxide and halothane were higher and mean blood pressure was lower in dogs using the to-and-fro system, possibly indicating an increased anaesthetic depth in this group. Use of both systems resulted in an elevated inspired carbon dioxide level, although this was significantly lower in the circle system. Further work will be required to determine the clinical relevance of this difference and whether rebreathing can be eliminated by higher fresh gas flows. The disposable circle studied may be used safely in dogs.

Descriptors: inhalation anesthesia, obstetrical anesthesia, capnography, comparative study, dogs, halothane, heart rate, respiration.

Joubert, K.E. (2000). **Routine veterinary anaesthetic management practices in South Africa.** *Journal of the South African Veterinary Association* 71(3): 166-172. ISSN: 0301-0732. **NAL Call Number:** 41.8 So8

Abstract: A survey of the routine anaesthetic management of dogs and cats during sterilisation by veterinarians in South Africa was conducted. This report describes the premedication, induction and maintenance agents most commonly used in dogs and cats. Information about monitoring of patients during the procedure and who is responsible for induction of anaesthesia and monitoring was obtained. Questionnaires were analysed with regard to demographic data, practice size, continuing education, the number of surgical procedures and sterilisations performed per week and an estimate of yearly mortality. Acetylpromazine is the most commonly used premedication in dogs and xylazine in cats. Thiopentone in dogs and alphaxalone/alphadolone in cats were the induction agents most commonly used. Alphaxalone/alphadolone in cats and halothane in dogs are the most commonly used main-

tenance agents. Records of anaesthesia are poorly kept and monitoring of patients is poorly performed. Respiratory rate is the parameter most commonly monitored (90.7%), and in most cases is the sole parameter. On average 10.34 +/- 8.25 cats were operated per week, of which 5.45 +/- 5.60 were sterilised; 17.79 +/- 11.61 dogs were operated per week, of which 8.65 +/- 7.10 were sterilised. In total, 190 patients died under anaesthesia, a mortality rate of 1:1,243. Just over 50% of practitioners had attended continuing education courses during their careers.

Descriptors: anesthesia, cats, dogs, veterinary medicine, mortality, statistics and numerical data, castration, education, questionnaires, South Africa

Kim DuckHwan, You MyungJo, Cho SungHwan, Lee SeongHo, Lee SeongOk, Kim InBong, Kwon GeonOh, Kim DH, You MJ, Cho SH, Lee SH, Lee SO, Kim IB, and Kwon GO (2001).

Studies on canine electroacupuncture anaesthesia: 2. Investigation of the effect of dorsal acupoints. *Journal of Veterinary Clinics* 18(4): 311-314. ISSN: 1598-298X .

Descriptors: acupuncture, anesthesia, surgery.

Ko, J.C., R.E. Mandsager, D.N. Lange, and S.M. Fox (2000). **Cardiorespiratory responses and plasma cortisol concentrations in dogs treated with medetomidine before undergoing ovariohysterectomy.** *Journal of the American Veterinary Medical Association* 217(4): 509-514. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To evaluate effects of medetomidine on anesthetic dose requirements, cardiorespiratory variables, plasma cortisol concentrations, and behavioral pain scores in dogs undergoing ovariohysterectomy. DESIGN: Randomized, prospective study. ANIMALS: 12 healthy Walker-type hound dogs. PROCEDURE: Dogs received medetomidine (40 micrograms/kg [18.2 micrograms/lb] of body weight, i.m.; n = 6) or saline (0.9% NaCl) solution (1 ml, i.m.; 6) prior to anesthesia induction with thiopental; thiopental dose needed for endotracheal intubation was compared between groups. Ovariohysterectomy was performed during halothane anesthesia. Blood samples were obtained at various times before drug administration until 300 minutes after extubation. Various physiologic measurements and end-tidal halothane concentrations were recorded. RESULTS: In medetomidine-treated dogs, heart rate was significantly lower than in controls, and blood pressure did not change significantly from baseline. Plasma cortisol concentrations did not increase significantly until 60 minutes after extubation in medetomidine-treated dogs, whereas values in control dogs were increased from time of surgery until the end of the recording period. Control dogs had higher pain scores than treated dogs from extubation until the end of the recording period. CONCLUSION AND CLINICAL RELEVANCE: Administration of medetomidine reduced dose requirements for thiopental and halothane and provided postoperative analgesia up to 90 minutes after extubation. Dogs undergoing ovariohysterectomy by use of thiopental induction and halothane anesthesia benefit from analgesia induced by medetomidine administered prior to anesthesia induction. Additional analgesia is appropriate 60 minutes after extubation.

Descriptors: adrenergic alpha-agonists, non-narcotic analgesics, anesthetics, blood pressure, body temperature, dogs, dose-response relationship, halothane, heart rate, hydrocortisone,

hysterectomy, medetomidine, ovariectomy, postoperative pain, preanesthetic medication, respiration, thiopental, time factors.

Ko, J.C.H., J.C. Thurmon, G.J. Benson, and W.J. Tranquilli (1993). **An alternative drug combination for use in declawing and castrating cats.** *Veterinary Medicine* 88(11): 1061-1065. ISSN: 8750-7943.

NAL Call Number: 41.8 M69

Descriptors: cats, anesthesia, drug combinations, anesthetics, intramuscular injection, castration, claws, surgical operations.

Kovalev, M.I. (1979). **Use of etaperazine.** *Veterinariia* (1): 71-72. ISSN: 0042-4846.

NAL Call Number: 41.8 V6426

Descriptors: anesthetics, castration, animals, dose response relationship, drug evaluation, perphenazine, time factors, male.

Kyles, A.E., E.M. Hardie, B.D. Hansen, and M.G. Papich (1998). **Comparison of transdermal fentanyl and intramuscular oxymorphone on post-operative behaviour after ovariohysterectomy in dogs.** *Research in Veterinary Science* 65(3): 245-251. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: The effects of transdermal fentanyl and i.m. oxymorphone on behavioural and physiological responses, after ovariohysterectomy in dogs, were investigated. The study involved three groups of 10 dogs: fentanyl/surgery (FS), oxymorphone/surgery (OS), fentanyl/control (FC). A transdermal fentanyl delivery system (50 microg hour⁻¹) (FS and FC) was applied 20 hours before surgery, or i.m. oxymorphone (OS) was administered. After ovariohysterectomy (FS and OS) or anaesthesia alone (FC), dogs were continuously videotaped for 24 hours and a standardised hourly interaction with a handler performed. The videotapes were analysed, and interactive and non-interactive behaviours evaluated. In addition, pain and sedation scores, pulse and respiratory rates, rectal temperature, arterial blood pressure, plasma cortisol and plasma fentanyl concentrations were measured. This study showed that transdermal fentanyl and i.m. oxymorphone (0.05 mg kg⁻¹) produced comparable analgesic effects over a 24 hour recording period. I.m. oxymorphone produced significantly more sedation and lower rectal temperatures than transdermal fentanyl. There were no significant differences between groups in respiratory and heart rates, and arterial blood pressures.

Descriptors: postoperative pain, pain score, respiration, heart rate, cortisol, administration and dosage of fentanyl, animal behavior, ovariohysterectomy, arterial blood pressure, dogs, oxymorphone.

Lambardt, A. (1975). **Akupunkturanalgesieversuche bei katzen. (Vorläufige Mitteilung) [Experimental acupuncture anaesthesia in the cat (preliminary communication)].** *Praktische Tierarzt* 56(1): 33-36. ISSN: 0032-681X.

NAL Call Number: 41.8 P882

Descriptors: acupuncture, ovariectomy, caesarean section, anesthesia, surgery, cats.

Lascelles, B.D., P. Cripps, S. Mirchandani, and A.E. Waterman (1995). **Carprofen as an analgesic for postoperative pain in cats: dose titration and assessment of efficacy in comparison to pethidine hydrochloride.** *The Journal of Small Animal Practice* 36(12): 535-541. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: The aim of this study was to titrate the optimal dose of carprofen for single dose usage, for alleviating postoperative pain, under a double-blind and randomised protocol, using both negative and positive controls. Renal tolerance was assessed by screening plasma urea and creatinine. Pre- and postoperative assessment of pain and sedation was made using a dynamic and interactive visual analogue scoring system in 60 cats undergoing ovariohysterectomy. The cats were randomly assigned to one of six groups: (1) carprofen at 1.0 mg/kg subcutaneously (sc); (2) carprofen at 2.0 mg/kg sc; (3) carprofen at 4.0 mg/kg sc; (4) pethidine at 5.0 mg/kg intramuscularly (im), (5) pethidine at 10.0 mg/kg im: and (6) no analgesics (injection of saline). All injections were given postoperatively on tracheal extubation and administered in a double-blind manner. Assessments were made up to 20 hours post extubation. Prior to induction and at 20 hours post extubation, blood samples were taken for laboratory analysis of the urea and creatinine content to check for any adverse effect on renal function. Cats given pethidine did not appear more sedated than the groups receiving carprofen or saline. Cats receiving carprofen were in less pain postoperatively overall, with 4.0 mg/kg being the most effective dose rate (significantly better than the other doses of carprofen at four and eight hours post extubation). The highest dose of pethidine provided significantly better analgesia than the highest dose of carprofen up to two hours post extubation, but from two to 20 hours post extubation carprofen at 4.0 mg/kg provided significantly better analgesia than the pethidine. None of the analgesic regimens appeared to affect renal function adversely, as measured by urea and creatinine levels.

Descriptors: analgesics, anti-inflammatory agents, cats, injections, carbazoles, meperidine, postoperative pain.

Lascelles, B.D., P.J. Cripps, A. Jones, and A.E. Waterman (1997). **Post-operative central hypersensitivity and pain: the pre-emptive value of pethidine for ovariohysterectomy.** *Pain: The Journal of the International Association for the Study of Pain* 73(3): 461-471. ISSN: 0304-3959.

NAL Call Number: RB127.P34

Abstract: The effect of timing of analgesic drug administration on the severity of post-operative pain was investigated in dogs undergoing ovariohysterectomy using both subjective visual assessment scoring systems (VAS) and objective mechanical nociceptive threshold measurements using a novel handheld anti-nociceptometric device. Forty dogs undergoing routine elective ovariohysterectomy were included in a randomised and double-blind study and assigned to one of three groups: (i) pre-operative analgesics; (ii) post-operative analgesics; (iii) no analgesics (saline injections). The analgesic used was pethidine (a short acting predominantly mu-opioid agonist), at a dose of 5.0 mg/kg (intramuscular). The post-operative administration of pethidine resulted in significantly higher sedation scores and significantly lower pain scores in the early post-operative period, but the dogs given pethidine pre-operatively had significantly lower pain scores than both the other groups at 8, 12 and 20 h post-extubation ($P < 0.01$, ANOVA). Mechanical thresholds measured at the distal tibia

demonstrated the development of allodynia at 12 and 20 h post-extubation, and this was significantly prevented by the pre- ($P < 0.01$ at 12 h, $P < 0.05$ at 20 h, Kruskal-Wallis and post hoc Dunn's), but not by the post-operative administration of pethidine. Mechanical nociceptive thresholds measured at the ventral midline (site of surgery) demonstrated post-operative hyperalgesia in all groups; this hyperalgesia was least in the pre-operative pethidine group. In summary, this study clearly shows pethidine to be an effective analgesic in dogs, albeit of short duration of action, when administered post-operatively, and, importantly, that it has a positive benefit in terms of post-operative outcome measures, when administered pre-operatively, possibly as a result of blocking or preventing the development of central sensitisation following surgical stimulation.

Descriptors: postoperative pain, ovariectomy, analgesics, timing of analgesics, pain threshold, dogs, stress, pethidine, visual assessment scoring system, anti-nociceptometric device.

Lascelles, B.D., P.J. Cripps, A. Jones, and A.E. Waterman-Pearson (1998). **Efficacy and kinetics of carprofen, administered preoperatively or postoperatively, for the prevention of pain in dogs undergoing ovariohysterectomy.** *Veterinary Surgery* 27(6): 568-582. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVE: To determine what effect the timing of carprofen administration has on the severity of postoperative pain in dogs undergoing ovariohysterectomy and to investigate the pharmacokinetics of carprofen under these conditions. STUDY DESIGN: A prospective, randomized, double-blind, clinical trial. ANIMALS: Sixty-two adult bitches weighing between 10 and 25 kgs, undergoing elective ovariohysterectomy. METHODS: Examinations were performed for 20 hours postoperatively using subjective visual assessment scoring systems (DIVAS) and objective mechanical nociceptive threshold measurements. Forty dogs were assigned to one of three groups: (1) preoperative carprofen; (2) postoperative carprofen; and (3) no analgesics (saline injections). The dose of carprofen was 4.0 mg/kg subcutaneously. In another 22 bitches, the pharmacokinetics of carprofen given preoperatively or postoperatively at the same dose were examined. RESULTS: The dogs given carprofen preoperatively had lower pain scores than the other groups, significantly so at 2 hours postextubation ($P < .01$ and $P < .05$, Kruskal-Wallis and post hoc Dunn's). Mechanical pain thresholds measured at the distal tibia showed the development of hyperalgesia at 12 and 20 hours postextubation; this was prevented by both the preoperative ($P < .05$ at 12 and 20 hours, Kruskal-Wallis) and postoperative ($P < .05$ at 20 hours, Kruskal-Wallis) administration of carprofen. Mechanical pain threshold testing at the wound showed a significant analgesic effect of carprofen. Plasma concentrations of carprofen were not directly related to analgesia; maximum plasma concentration, the area under the curve to the last data point, and area under the first moment curve up to the last data point were all significantly higher in the dogs given carprofen postoperatively ($P < .05$, Mann-Whitney). CONCLUSION: Preoperative administration of carprofen has a greater analgesic effect than postoperative administration in the early postoperative period in dogs undergoing ovariohysterectomy. Plasma levels of carprofen are not related to the degree of analgesia achieved. CLINICAL RELEVANCE: Carprofen provides effective analgesia after canine ovariohysterectomy. The timing of analgesic administration is important to optimize the control of postoperative pain.

Descriptors: postoperative pain, ovariohysterectomy, anti-inflammatory agents, dogs, carbazoles, pain measurement, pain threshold, analgesia, timing.

Lascelles, B.D.X., C.A. Capner, and A.E. Waterman-Pearson (1999). **Current British veterinary attitudes to perioperative analgesia for cats and small mammals.** *The Veterinary Record* 145(21): 601-604. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: survey, questionnaire, perioperative analgesia, pain, surgical procedures, ovariohysterectomy, orthopaedic surgery, laparotomy, castration, postoperative care.

Lemke, K.A., C.L. Runyon, and B.S. Horney (2002). **Effects of preoperative administration of ketoprofen on anesthetic requirements and signs of postoperative pain in dogs undergoing elective ovariohysterectomy.** *Journal of the American Veterinary Medical Association* 221(9): 1268-1275. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: ketoprofen, pain score, dogs, gonadectomy, anesthetic requirements, premedication, behavioral scores, activity levels, pain measurement.

Lemke, K.A., C.L. Runyon, and B.S. Horney (2002). **Effects of preoperative administration of ketoprofen on whole blood platelet aggregation, buccal mucosal bleeding time, and hematologic indices in dogs undergoing elective ovariohysterectomy.** *Journal of the American Veterinary Medical Association* 220(12): 1818-1822. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine effects of preoperative administration of ketoprofen on whole blood platelet aggregation, buccal mucosal bleeding time, and hematologic indices in dogs after elective ovariohysterectomy. DESIGN: Randomized, masked clinical trial. ANIMALS: 22 healthy dogs. PROCEDURE: 60 minutes before induction of anesthesia, 11 dogs were given 0.9% NaCl solution (control), and 11 dogs were given ketoprofen (2 mg/kg [0.9 mg/lb], IM). Thirty minutes before induction of anesthesia, glycopyrrolate (0.01 mg/kg [0.005 mg/lb]), acepromazine (0.05 mg/kg [0.02 mg/lb]), and butorphanol (0.2 mg/kg [0.09 mg/lb]) were given IM to all dogs. Anesthesia was induced with thiopental (5 to 10 mg/kg [2.3 to 4.5 mg/lb], IV) and maintained with isoflurane (1 to 3%). Ovariohysterectomy was performed and butorphanol (0.1 mg/kg [0.05 mg/lb], IV) was given 15 minutes before completion of surgery. Blood samples for measurement of variables were collected at intervals before and after surgery. RESULTS: In dogs given ketoprofen, platelet aggregation was decreased 95 +/- 10% and 80 +/- 35% (mean +/- SD) immediately after surgery and 24 hours after surgery, respectively, compared with preoperative values. At both times, mean values in dogs given ketoprofen differed significantly from those in control dogs. Significant differences between groups were not observed for mucosal bleeding time or hematologic indices. CONCLUSIONS AND CLINICAL RELEVANCE: Preoperative administration of ketoprofen inhibited platelet aggregation but did not alter bleeding time. Ketoprofen can be given before surgery to healthy dogs undergoing elective ovariohysterectomy, provided that dogs are screened for potential bleeding problems before surgery and monitored closely after surgery.

Descriptors: anti-inflammatory agents, bleeding time, cyclooxygenase inhibitors, dogs,

female, hysterectomy, ketoprofen, ovariectomy, platelet aggregation, postoperative period, premedication, preoperative care, time factors.

Lerche, P., W.W. Muir, and T.L. Grubb (2002). **Mask induction of anaesthesia with isoflurane or sevoflurane in premedicated cats.** *The Journal of Small Animal Practice* 43(1): 12-15. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: A comparison was made of the time to and quality of induction of anaesthesia when sevoflurane (n=14) or isoflurane (n=14) was delivered by mask in premedicated healthy adult cats presented for elective surgery. Times to induction and intubation were significantly shorter with sevoflurane (210 +/- 57 seconds and 236 +/- 60 seconds, respectively) than with isoflurane (264 +/- 75 seconds and 292 +/- 73 seconds). The quality of induction was similar for both agents. Two cats in each group developed opisthotonus of less than 45 seconds' duration. Both sevoflurane and isoflurane produced mask induction of anaesthesia of a similar quality in this species. Sevoflurane provided more rapid induction of anaesthesia and establishment of a controlled airway than isoflurane.

Descriptors: acepromazine, inhalation anesthesia, cats, heart rate, isoflurane, laryngeal masks, methyl ethers, orchietomy, ovariectomy, respiration.

Lester, P.A., J.S. Gaynor, P.W. Hellyer, K. Mama, and A.E. Wagner (2003). **The sedative and behavioral effects of nalbuphine in dogs.** *Contemporary Topics in Laboratory Animal Science* 42(4): 27-31. ISSN: 1060-0558.

NAL Call Number: SF405.5.A23

Abstract: We compared the degree of sedation and frequency and intensity of adverse behaviors in dogs associated with nalbuphine when combined with acepromazine or xylazine compared with those of acepromazine or xylazine alone. Twenty-four dogs (13 female, 11 male) undergoing routine ovariohysterectomy or castration were randomly assigned to one of four groups. Group NX received 0.5 mg/kg nalbuphine and 0.5 mg/kg xylazine subcutaneously (s.c.). Group X received 0.5 mg/kg xylazine s.c. Group NA received 0.5 mg/kg nalbuphine and 0.05 mg/kg acepromazine s.c. Group A received 0.05 mg/kg acepromazine s.c. All dogs received 0.01 mg/kg glycopyrrolate s.c. All doses were administered preoperatively. Preoperative resting measurements of heart rate, respiratory rate, rectal temperature, and body weight were obtained. Sedation was scored both inside and outside a kennel prior to drug administration and at 10, 20, and 30 min after drug administration. Dogs were assessed for behavioral responses (leg withdrawal, shivering, rigidity, orienting, panting, struggling, vocalization, wide-eyed facial expression, breath holding, salivating, hiding, biting, or requiring a muzzle) during three time periods: placing the dog on the table, clipping and prepping of forelimb, and intravenous catheterization. Postoperative recovery behaviors were scored. Expired halothane concentrations were recorded at 15, 30, and 45 min postinduction. Significant differences occurred in the level of sedation at 30 min between dogs receiving nalbuphine and xylazine or xylazine only compared with dogs receiving acepromazine. There was a significant difference in behavioral scores with respect to leg withdrawal and orienting during clipping/prepping between dogs receiving nalbuphine and xylazine compared with dogs receiving xylazine. The combination of nalbuphine and xylazine is a useful premedicant which provided greater sedation than acepromazine and reduced

some anxiety behaviors more than did xylazine alone. Nalbuphine is an inexpensive opioid and currently is not a controlled substance in the U.S.

Descriptors: acepromazine, opioid analgesics, drug effects on behavior, conscious sedation, glycopyrrolate, hypnotics and sedatives, subcutaneous injections, nalbuphine, preanesthetic medication, xylazine.

Lobetti, R. and N. Lambrechts (2000). **Effects of general anesthesia and surgery on renal function in healthy dogs.** *American Journal Of Veterinary Research* 61(2): 121-124. ISSN: 0002-9645. **NAL Call Number:** 41.8 Am3A

Abstract: OBJECTIVES: To evaluate renal function in healthy dogs undergoing general anesthesia and ovariohysterectomy without concurrent IV administration of fluids. ANIMALS: 35 healthy client-owned dogs. PROCEDURE: Dogs were medicated with promazine hydrochloride (0.05 mg/kg of body weight, SC) approximately 45 minutes before induction of anesthesia with thiopental sodium (10 to 15 mg/kg, IV). Anesthesia was maintained with 2% halothane in oxygen. Ovariohysterectomies were performed by senior veterinary students under the direct supervision of a veterinary surgeon. Renal function was assessed (serum urea and creatinine concentrations, fractional clearance of sodium, urine alkaline phosphatase [ALP] and gamma-glutamyltransferase [GGT] activities, urine specific gravity, and enumeration of renal tubular epithelial cells in urine sediment) prior to and 24 and 48 hours after surgery. RESULTS: Duration of general anesthesia ranged from 80 to 310 minutes. Urine specific gravity and ALP activity and serum urea and creatinine concentrations did not change over time. Fractional clearance of sodium decreased 24 and 48 hours after surgery, whereas urine GGT activity and the ratio of urine GGT activity to urine creatinine concentration increased 24 hours after surgery, compared with presurgery values. Renal tubular epithelial cells increased in number in urine sediment from 11 of 35 (31.4%) dogs and 5 of 35 (14.3%) dogs 24 and 48 hours after surgery, respectively. However, this increase was not clinically relevant. CONCLUSIONS AND CLINICAL RELEVANCE: Intravenous administration of fluids to healthy dogs undergoing general anesthesia and elective surgery may not be necessary for maintenance of renal homeostasis.

Descriptors: general anesthesia, blood creatinine, dogs, epithelial cells, female, hysterectomy, kidney function tests, ovariectomy, promazine, reference values, thiopental, urea, gamma-glutamyltransferase.

Lobetti, R.G. and K.E. Joubert (2000). **Effect of administration of nonsteroidal anti-inflammatory drugs before surgery on renal function in clinically normal dogs.** *American Journal Of Veterinary Research* 61(12): 1501-1507. ISSN: 0002-9645. **NAL Call Number:** 41.8 Am3A

Abstract: OBJECTIVES: To investigate renal function in clinically normal dogs undergoing general anesthesia for ovariohysterectomies that received nonsteroidal antiinflammatory drugs (NSAID) before surgery. ANIMALS: 40 clinically normal dogs. PROCEDURE: After induction of anesthesia, dogs were given an analgesic. Renal function was assessed before surgery and 24 and 48 hours after surgery by means of serum urea and creatinine concentrations, fractional clearance of sodium (FC(Na)), urine gamma-glutamyltransferase (GGT) and alkaline phosphatase (ALP) activities, and urine analysis. Ten dogs in each of 4 groups received ketorolac tromethamine (0.5 mg/kg of body weight), ketoprofen (1 mg/

kg), carprofen (4 mg/kg), or morphine (0.1 mg/kg; control group). **RESULTS:** Duration of general anesthesia ranged from 1.75 to 5 hours, with a mean of 3 hours. Two ketorolac- and 2 ketoprofen-treated dogs had transient azotemia. A significant decrease in the FC(Na) between before surgery and 24 hours after surgery, and between before surgery and 48 hours after surgery, was found in ketoprofen- and carprofen-treated dogs. Ketorolac-, ketoprofen-, and morphine-treated dogs had a decrease in urine specific gravity. Two ketorolac, 1 ketoprofen-, 1 carprofen-, and 4 morphine-treated dogs had increases in renal tubular epithelial cells on urine sediment examination 24 hours after surgery. **CONCLUSIONS AND CLINICAL RELEVANCE:** In clinically normal dogs undergoing general anesthesia and elective surgery, the use of NSAID as analgesics is not contraindicated. Compared with ketorolac or ketoprofen, carprofen had the least effect on renal function and integrity.

Descriptors: alkaline phosphatase, anti-inflammatory agents, creatinine, dogs, hysterectomy, kidney, ovariectomy, postoperativeperiod, reference values, sodium, gamma-glutamyltransferase.

Mastrocinque, S. and D.T. Fantoni (2003). **A comparison of preoperative tramadol and morphine for the control of early postoperative pain in canine ovariohysterectomy.** *Veterinary Anaesthesia and Analgesia* 30(4): 220-228. ISSN: 1467-2987.

NAL Call Number: SF914.V47

Abstract: **OBJECTIVE:** To compare morphine with tramadol for the management of early postoperative pain following ovariohysterectomy after pyometra in dogs. **STUDY DESIGN:** Prospective randomized blinded clinical trial. **ANIMALS:** Thirty female dogs, 2-14 years old. **METHODS:** Animals were randomly divided into two equal groups. Group 1 received 0.2 mg kg⁻¹ of morphine IV and group 2 received 2 mg kg⁻¹ of tramadol IV after the induction of anesthesia. The dogs were premedicated with acepromazine, and anesthesia was induced with intravenous midazolam and ketamine. Isoflurane was used for the maintenance of anesthesia. The variables measured were: analgesia; sedation; cardiac and respiratory rates; arterial blood pressure; end-tidal isoflurane and carbon dioxide (P_e'CO₂); oxyhemoglobin saturation (SpO₂); plasma catecholamines; serum cortisol and glucose concentrations; pH and blood gases. The animals were monitored for 6 hours after the administration of the analgesic agent. **RESULTS:** There were no differences between the two groups with regard to analgesia, sedation, SpO₂, pH and blood gases, cardiovascular variables, glucose, catecholamine and cortisol concentrations. Forty minutes postopioid administration, the end-tidal isoflurane concentration was significantly lower in the morphine-treated group as compared to the tramadol group. At 30 minutes following opioid injection, P_e'CO₂ was significantly higher in the morphine group than in the tramadol group. Two dogs in the tramadol group and one in the morphine group were given morphine postoperatively because of increasing pain scores. **CONCLUSION AND CLINICAL RELEVANCE:** Morphine and tramadol, administered preemptively can be used safely in dogs to control early pain after ovariohysterectomy without significant adverse effects.

Descriptors: opioid analgesics, dogs, hysterectomy, morphine, infusions, ovariectomy, pain measurement, premedication, tramadol.

Mendes, G.M., A.L. Selmi, G.R. Barbudo-Selmi, B.T. Lins, and J.P. Figueiredo (2003). **Clinical use of dexmedetomidine as premedicant in cats undergoing propofol-sevoflurane anaesthesia.** *Journal of Feline Medicine and Surgery* 5(5): 265-270. ISSN: 1098-612X.

NAL Call Number: SF985.J68

Abstract: The purpose of this report was to evaluate the cardiorespiratory effects and efficacy of dexmedetomidine as a premedicant agent in cats undergoing ovariohysterectomy anaesthetized with propofol-sevoflurane. Cats were randomly divided into two groups of eight animals each. Dexmedetomidine (0.01 mg/kg) or 0.9% saline was administered intravenously (D and S, respectively). After 5 min, propofol was administered intravenously and anaesthesia was maintained with sevoflurane. Heart and respiratory rates, arterial blood pressure, oxygen saturation, rectal temperature and the amount of propofol needed for induction were measured. Premedication with dexmedetomidine reduced the requirement of propofol (6.7+/-3.8 mg/kg), but induced bradycardia, compared with the administration of saline (15.1+/-5.1 mg/kg). Recovery quality was significantly better in D but no significant difference in time to return of swallowing reflex was observed between groups (D=2.5+/-0.5 min; S=3.2+/-1.8 min). In conclusion, dexmedetomidine is a safe and effective agent for premedication in cats undergoing propofol-sevoflurane anaesthesia with minimal adverse effects.

Descriptors: inhalation anesthetics, cats, dexmedetomidine, heart rate, hysterectomy, ovariectomy, premedication, propofol, respiration.

O'Boyle, M.A. and G.K. Vajda (1975). **Acupuncture anesthesia for abdominal surgery.** *Modern Veterinary Practice* 56(10): 705-707. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: abdomen, acupuncture therapy, anesthesia, castration, dogs, female, hysterectomy, male.

Ogilvie, G.K., M.D. Salman, M.L. Kesel, and M.J. Fettman (1996). **Effect of anesthesia and surgery on energy expenditure determined by indirect calorimetry in dogs with malignant and nonmalignant conditions.** *American Journal of Veterinary Research* 57(9): 1321-1326. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To determine energy expenditure (EE) of apparently resting, client-owned dogs with malignant or nonmalignant diseases that were recovering from anesthesia and surgery, and compare those values with values from clinically normal, apparently resting, client owned dogs. ANIMALS: 40 apparently resting, client-owned dogs that had been given general anesthesia for various elective and nonelective surgical procedures, and 30 apparently resting, clinically normal client-owned dogs used as controls. PROCEDURE: EE was determined, using an open-flow indirect calorimetry system. Each dog was evaluated before and after surgery (0, 1, 2, and 3 days after surgery, then at suture removal > 14 days later) and compared with apparently resting, clinically normal, client-owned dogs (n = 30). Parameters evaluated were rate of oxygen consumption (Vo₂/kg of body weight: ml/min/kg; Vo₂/kg^{0.75}: ml/min/kg^{0.75}), EE (EE/kg: kcal/kg/d; EE/kg^{0.75}: kcal/kg^{0.75}/d), and respiratory quotient. RESULTS: Surgery and anesthesia did not significantly alter any of these parameters at any time assessed in any group. The pretreatment Vo₂ and EE were significantly lower in the dogs with cancer, compared with dogs of other groups. CONCLUSIONS: These

data suggest that the EE of a restricted group of dogs that undergo anesthesia and surgery for malignant and nonmalignant conditions does not increase from baseline values or when compared with values in clinically normal, client-owned dogs. **CLINICAL RELEVANCE:** This information may be of value when planning nutritional treatment for dogs recovering from anesthesia and surgery.

Descriptors: general anesthesia, indirect calorimetry, dogs, energy metabolism, fractures, dogs, hysterectomy, orchietomy, ovariectomy.

Patel, C.M. and D. Yates (2003). **Evaluation of an anaesthetic protocol for the neutering of eight-to 12-week-old puppies.** *The Veterinary Record* 152(14): 439-440. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: aging, adverse effects of anesthesia, inhalation anesthetics, intravenous anesthetics, animal, castration, dogs.

Quessada, A.M., C.S.A. Santana, H.L. Silva da, and H.L. da Silva (2001). **Anestesia local para ovariectomia em gatas [Local anesthesia for ovariectomy in cats].** *Semina* 22(2): 175-177.

ISSN: 0101-3742.

NAL Call Number: Q33.S46

Descriptors: local anaesthesia, local anaesthetics, ovariectomy, surgery, surgical operations, techniques, cats.

Language of Text: Portuguese; Summary in English.

Rutherford, K.M.D. (2002). **Assessing pain in animals.** *Animal Welfare* 11(1): 31-53. ISSN: 0962-7286.

NAL Call Number: HV4701.A557

Descriptors: animals, pain, poultry, debeaking, lambs, docking, tail, castration, dogs, ovariectomized females, ovariectomy, postoperative care, analgesics, stimuli, avoidance conditioning, animal behavior, literature reviews.

Santos FC dos, Rahal SC, Leite CAL, and dos Santos FC (2003). **Postoperative use of anti-inflammatory drugs on small animals -- demographic study.** *A Hora Veterinaria* 22(132): 13-16.

ISSN: 0101-9163.

Descriptors: anti-inflammatory agents, castration, complications, flunixin, nonsteroidal anti-inflammatory agents, postoperative care, small animal practice, surgery, surgical operations, veterinarians.

Seif, D.P. (1994). **Anesthesia for early spaying/neutering.** *Journal of the American Veterinary Medical Association* 205(10): 1393. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: anesthesia, castration, cats, dogs, female, male.

Sendler, K., C. Lendl, I. Henke, K. Otto, U. Matis, S. Mundt, and W. Erhardt (1994). **Zur Anästhesie bei der Katze mit Tiletamin/Zolazepam in Minimaldosierung [Anesthesia in cats using tiletamine/zolazepam in minimal doses].** *Tierärztliche Praxis* 22(3): 286-290. ISSN: 0303-6286.

NAL Call Number: SF603.V4

Abstract: The object of this study was to evaluate minimal dose anesthesia with Tiletamine/Zolazepam for castration, dental treatments and other minor surgical procedures in cats. The study included 264 cats treated either at the Department of Veterinary Surgery, Ludwig-Maximilians University of Munich or under private practice conditions, in a small animal clinic in Hamburg (Germany). The drug dose needed for anesthesia for a 10 minute surgical procedure was calculated in each case using a formula. Side effects that occurred with doses recommended by the manufacturer could not be eliminated by decreasing the drug dose, but could be reduced considerably in severity and duration. Tiletamine/Zolazepam was found to be a useful drug for short anesthesia in cats at an average dose of 4.2 mg/kg. Article in German.

Descriptors: anesthesia, cats, electrocardiography, heart rate, reflex, respiration, tiletamine, zolazepam.

Language of Text: German; Summary in English.

Shafford, H.L., P.W. Hellyer, K.T. Crump, A.E. Wagner, K.R. Mama, and J.S. Gaynor (2002). **Use of a pulsed electromagnetic field for treatment of post-operative pain in dogs: a pilot study.** *Veterinary Anaesthesia and Analgesia* 29(1): 43-48. ISSN: 1467-2987.

NAL Call Number: SF914.V47

Descriptors: body temperature, morphine, pain, pulse rate, respiration, surgery, dogs.

Slingsby, L.S., A. Jones, and A.E. Waterman-Pearson (2001). **Use of a new finger-mounted device to compare mechanical nociceptive thresholds in cats given pethidine or no medication after castration.** *Research in Veterinary Science* 70(3): 243-246. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: Mechanical nociceptive thresholds are regularly used to determine the efficacy of analgesic agents both experimentally and clinically in a variety of species. The 'pressure of palpation device' (PPD) was developed for use in cats and is a small battery operated device with a finger-mounted force sensing resistor (FSR, Interlink Electronics, Northumberland, UK). The PPD was used in a study assessing the analgesic efficacy of pethidine after castration in cats. Pethidine was demonstrated to prevent the development of post-operative scrotal hypersensitivity for up to 2 hours after castration, whereas cats given no analgesics showed marked hyperalgesia immediately after surgery. Visual Analogue Scale (VAS) pain scores after castration showed a similar analgesic effect of pethidine. These results suggest that the PPD could become a useful research tool to assess the effectiveness of analgesic agents in the cat.

Descriptors: opioid analgesics, cats, hyperalgesia, pain scores, pain management, pain thresholds, pressure of palpation device (PPD).

Slingsby, L.S., E.C. Lane, E.R. Mears, M.C. Shanson, and A.E. Waterman-Pearson (1998). **Post-operative pain after ovariohysterectomy in the cat: a comparison of two anaesthetic regimens.** *The Veterinary Record* 143(21): 589-590. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: dissociative anesthetics, non-narcotic analgesics, inhalation anesthetics, intravenous anesthetics, cats, hysterectomy, halothane, ketamine, medetomidine, acepromazine, postoperative pain, thipental.

Slingsby, L.S. and A.E. Waterman-Earson (2002). **Comparison between meloxicam and carprofen for postoperative analgesia after feline ovariohysterectomy.** *The Journal of Small Animal Practice* 43(7): 286-289. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: Eighty female cats presented for ovariohysterectomy were randomly allocated to one of two treatment groups in this assessor-blinded trial. After pre-anaesthetic assessment, the cats were premedicated with acepromazine (0.1 mg/kg). Anaesthesia was induced with thiopentone and maintained with halothane in oxygen. Forty cats received carprofen (4 mg/kg subcutaneously) and 40 received meloxicam (0.3 mg/kg subcutaneously) after anaesthetic induction. Following routine flank ovariohysterectomy the cats were assessed using visual analogue scale scores for pain and sedation over a 20-hour study period. Blood samples were taken before sedation and at 20 hours for serum biochemistry (urea, creatinine, alanine aminotransferase and aspartate aminotransferase). There were no significant differences between the groups for pain and sedation scores. Serum biochemistry values were similar between the groups, with some differences within groups between the pre-sedation and 20-hour values. One cat in the carprofen group and two cats in the meloxicam group required rescue analgesia with intramuscular morphine (0.2 mg/kg).

Descriptors: nonnarcotic analgesics, antiinflammatory agents, carbazoles, cats, comparative study, ovariohysterectomy, pain scores, postoperative pain, sedation.

Slingsby, L.S. and A.E. Waterman-Pearson (2001). **Analgesic effects in dogs of carprofen and pethidine together compared with the effects of either drug alone.** *The Veterinary Record* 148(14): 441-444. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: Thirty bitches undergoing routine neutering were used in an assessor-blinded trial of the postoperative analgesic effects of pethidine and carprofen administered either together or singly. The level of analgesia was assessed by visual analogue scale (VAS) scores for pain and sedation and by nociceptive mechanical threshold testing. The two drugs administered together, and carprofen alone, provided good postoperative analgesia as assessed by VAS scoring. Pethidine alone did not provide postoperative analgesia of sufficient duration.

Descriptors: adjuvants, opioid analgesics, anti-inflammatory agents, carbazoles, dogs, hysterectomy, meperidine, pain measurement, postoperative pain.

Slingsby, L.S. and A.E. Waterman-Pearson (2000). **The post-operative analgesic effects of ketamine after canine ovariohysterectomy--a comparison between pre- or post-operative administration.** *Research in Veterinary Science* 69(2): 147-152. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: Thirty-six female dogs undergoing ovariohysterectomy were randomly allocated into three groups in this assessor-blinded study. The control group received no ketamine, the preketamine group were given ketamine (2.5 mg kg⁻¹i.m.) at anaesthetic induction (in addition to the induction agents), the post-ketamine group received ketamine (2.5 mg kg⁻¹i.m.) at extubation. Mechanical nociceptive thresholds and visual analogue scale (VAS) scores were measured before premedication and post-operatively at 20 minutes, 1, 2, 4, 8 and 18 hours after extubation. Dogs in the control group required more rescue analgesics than those in the other two groups (significantly more than the preketamine group), they also had

consistently higher VAS pain scores throughout the post-operative period. Administration of ketamine post-operatively delayed the onset of post-operative wound hyperalgesia; dogs in the control group had the greatest amount of post-operative wound hyperalgesia. A single subanaesthetic dose of ketamine provided effective but short acting analgesia and preoperative administration may confer some benefits over administration post-operatively.

Descriptors: analgesia, dissociative anesthetics, dogs, hysterectomy, ketamine, ovariectomy, pain threshold, postoperative care, preoperative care, wounds and injuries.

Slingsby, L.S. and A.E. Waterman Pearson (2000). **Postoperative analgesia in the cat after ovariohysterectomy by use of carprofen, ketoprofen, meloxicam or tolfenamic acid.** *The Journal of Small Animal Practice* 41(10): 447-450. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: cats, nonsteroidal anti-inflammatory agents, ketoprofen, efficacy, postoperative care, ovariectomy, hysterectomy, anesthesia, pain.

Smith, J.D., S.W. Allen, and J.E. Quandt (1999). **Changes in cortisol concentration in response to stress and postoperative pain in client-owned cats and correlation with objective clinical variables.** *American Journal Of Veterinary Research* 60(4): 432-436. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To identify clinical variables that indicate postoperative pain in cats after ovariohysterectomy in a veterinary hospital setting. ANIMALS: 40 cats. PROCEDURE: Cats were anesthetized and ovariohysterectomized by senior veterinary students. Butorphanol (0.1 mg/kg [n = 20] or 0.3 mg/kg [20] of body weight) was administered IM after surgery. Blood samples were obtained before, during, and after the anesthetic period for measurements of PCV and blood glucose and cortisol concentrations. Clinical variables measured included heart rate, systolic blood pressure, respiratory rate, and rectal temperature. Data for these variables were compared with changes in cortisol concentrations and with similar data-which was used as historical control data-obtained from 20 cats in another study (10 that had been ovariohysterectomized but had not received butorphanol and 10 that had only been anesthetized). RESULTS: Surgical durations were longer in this study, and cats had higher cortisol concentrations, compared with historical control cats. Objective clinical variables did not consistently correlate with changes in cortisol concentration. CONCLUSIONS: Cortisol concentration increased in response to surgical stress and pain. This response was greater in cats in which duration of surgery was longer. CLINICAL RELEVANCE: The objective clinical variables evaluated in this study were not consistent indicators of pain in an uncontrolled, clinical situation.

Descriptors: cats, female, heart rate, hydrocortisone, ovariohysterectomy, postoperative pain, stress.

Smith, J.D., S.W. Allen, J.E. Quandt, and R.L. Tackett (1996). **Indicators of postoperative pain in cats and correlation with clinical criteria.** *American Journal of Veterinary Research* 57(11): 1674-1678. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To identify clinical indicators that may help identify postoperative pain in cats after ovariohysterectomy. ANIMALS: Healthy, laboratory animal source cats.

PROCEDURE: Clinical indicators of pain were identified, and relief from pain in response to butorphanol was studied in 5 groups of cats. 10 cats had 1 hour of general anesthesia only, followed by recovery without additional medication. 10 cats had general anesthesia and ovariohysterectomy, followed by recovery without additional medication. 10 cats had general anesthesia, ovariohysterectomy, and postoperative administration of 0.1 mg of butorphanol/kg of body weight. Another 10 cats had general anesthesia, ovariohysterectomy, and postoperative administration of 0.3 mg butorphanol/kg. 10 cats received 0.1 mg of butorphanol/kg, IM, only. Samples and recorded data were obtained before, during, and after the anesthesia period. Clinical variables measured included heart rate, blood pressure, respiratory rate, rectal temperature, PCV, and blood glucose concentration. Results were compared with changes in norepinephrine, epinephrine, and cortisol concentrations. **RESULTS:** Cats that did not receive analgesics had higher cortisol concentration than did cats without surgery and cats that received butorphanol after surgery. Systolic blood pressure measured by ultrasonic Doppler was found to be predictive of cortisol concentration, using a multiple linear regression model. **CONCLUSIONS:** Cortisol concentration increased in response to surgical stress and pain, and this increase was diminished by use of butorphanol. **CLINICAL RELEVANCE:** Systolic blood pressure was the best clinical predictor of postoperative pain.

Descriptors: analgesics, anesthesia, blood glucose, blood pressure, butorphanol, cats, hysterectomy, norepinephrine, ovariectomy, pain measurement, veterinary, postoperative pain.

Souza, H., M. Hahn, L. da Silva, R. Leivas, C. Belchior, C. Teixeira, M. Daiha, R. Graca, and K. Corgozinho (2001). **Neuro-endocrine response of cats to spaying, with analgesia provided by butorphanol tartrate and/or flunixin meglumine.** *A Hora Veterinaria* 21(124): 13-20. ISSN: 0101-9163.

Descriptors: analgesics, butorphanol, castration, flunixin, stress, surgery.

Stegmann, G.F. and L. Bester (2001). **Some cardiopulmonary effects of midazolam premedication in clenbuterol-treated bitches during surgical endoscopic examination of the uterus and ovariohysterectomy.** *Journal of the South African Veterinary Association* 72(1): 33-36. ISSN: 0301-0732.

NAL Call Number: 41.8 So8

Abstract: Midazolam was administered intravenously to 8 bitches in a randomised, placebo-controlled clinical trial before propofol induction of surgical anaesthesia. Anaesthesia was maintained with isoflurane-in-oxygen during surgical endoscopic examination of the uterus and ovariohysterectomy. Clenbuterol was administered at the start of surgery to improve uterine muscle relaxation, and to facilitate endoscopic examination of the uterus. Ventilation was controlled. Induction of anaesthesia with propofol to obtain loss of the pedal reflex resulted in a statistically significant ($P < 0.05$) decrease in minute volume and arterial oxygen partial pressure in the midazolam group. Apnoea also occurred in 50% of dogs in the midazolam group. The dose for propofol in the midazolam group was 7.4 mg/kg compared to 9.5 mg/kg in the control. Minute volume was significantly ($P < 0.05$) higher in both groups during isoflurane maintenance, compared to the value after incremental propofol to obtain loss of the pedal reflex. Propofol induction resulted in a 25-26% reduction in the mean arterial blood pressure in both groups, and the administration of clenbuterol at the start of surgery resulted in a transient, but statistically significant ($P < 0.05$), decrease in mean arte-

rial blood pressure in the midazolam group during isoflurane anaesthesia. It is concluded that intravenous midazolam premedication did not adversely affect cardiovascular function during propofol induction, but intra-operative clenbuterol during isoflurane maintenance of anaesthesia may result in transient hypotension. Midazolam premedication may increase adverse respiratory effects when administered before propofol induction of anaesthesia.

Descriptors: anesthetics, blood pressure, midazolam, drug interactions, dogs, clenbuterol, cardiovascular function, hypotension, ovariohysterectomy, preanesthetic medication.

Stegmann, G.F. and L. Bester (2001). **Some clinical effects of midazolam premedication in propofol-induced and isoflurane-maintained anaesthesia in dogs during ovariohysterectomy.**

Journal of the South African Veterinary Association 72(4): 214-216. ISSN: 0301-0732.

NAL Call Number: 41.8 So8

Abstract: In a randomised, placebo-controlled clinical trial, anaesthesia was induced with propofol (4 mg/kg) after intravenous premedication with or without midazolam (0.1 mg/kg), in a group of 8 dogs scheduled for ovariohysterectomy. Midazolam administration induced acute behavioural changes, and increased reflex suppression after propofol induction. Compared to the control group, the dose required to obtain loss of the pedal reflex was significantly reduced by 37%, and the end-tidal isoflurane concentration during maintenance, reduced by 23%.

Descriptors: anesthetics, ovariohysterectomy, midazolam, preanesthetic medication, isoflurane, behavioral changes, reflex suppression, dogs.

Universities Federation for Animal Welfare (1981). **Feral cats: notes for veterinary surgeons.** *The Veterinary Record* 108(14): 301-303. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: Feral cats are usually difficult to handle. In order to neuter or treat them they should be trapped and immobilised by injection of an agent such as ketamine. This is easier to do if the cat is in a squeeze-back container. Once immobilised, clinical examination, general anaesthesia or euthanasia are straightforward. If the cat is to be ovariohysterectomised, absorbable suture materials and long-acting antibiotics should be used so that recapture will be unnecessary. In colony control schemes all cats left on site should be neutered, marked for identification, vaccinated against feline infectious enteritis with a single dose live vaccine and wormed regularly.

Descriptors: anesthesia, animals, cats, immobilization, euthanasia, veterinary surgery, ovariohysterectomy, neutering.

Vaha-Vahe, T. (1989). **The clinical efficacy of medetomidine.** *Acta Veterinaria Scandinavica. Supplementum* 85: 151-153. ISSN: 0065-1699.

NAL Call Number: 41.8 Ac87 Suppl.

Abstract: Studies on the clinical efficacy of medetomidine, a novel alpha-2 adrenoceptor agonist, are reviewed. Medetomidine has been shown to produce a reliable state of sedation, relaxation and recumbency suitable for small animal practice. In dogs, the optimal clinical dose for examinations, clinical procedures and minor surgical interventions seems to be 30-40 micrograms/kg intramuscularly and in cats 80-110 micrograms/kg. Other effects of medetomidine reported include bradycardia, nausea and vomiting. Occasional muscle

jerkings have been also reported after medetomidine injection. In special investigations, medetomidine has successfully been used in wound suturation and ovariohysterectomy in dogs and for sedation in dogs with heart diseases. Medetomidine-ketamine combination has been shown to be useful for anesthesia and immobilization in cats and zoo animals. The medetomidine-fentanyl combination was tested in dog: The administration of fentanyl increased the sedation and analgesia obtained with medetomidine. Medetomidine appears to be a potent sedative and analgesic agent for clinical use.

Descriptors: adrenergic alpha-agonists, analgesics, animals, clinical trials, hypnotics and sedatives, imidazoles, medetomidine.

Vaisanen, M., M. Raekallio, E. Kuusela, P. Huttunen, J. Leppaluoto, P. Kirves, and O. Vainio (2002).

Evaluation of the perioperative stress response in dogs administered medetomidine or acepromazine as part of the preanesthetic medication. *American Journal of Veterinary Research* 63(7): 969-975. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To compare the perioperative stress response in dogs administered medetomidine or acepromazine as part of the preanesthetic medication. ANIMALS: 42 client-owned dogs that underwent elective ovariohysterectomy. PROCEDURE: Each dog was randomly allocated to receive medetomidine and butorphanol tartrate (20 microgram/kg and 0.2 mg/kg, respectively, IM) or acepromazine maleate and butorphanol (0.05 and 0.2 mg/kg, respectively, IM) for preanesthetic medication. Approximately 80 minutes later, anesthesia was induced by administration of propofol and maintained by use of isoflurane in oxygen. Each dog was also given carprofen before surgery and buprenorphine after surgery. Plasma concentrations of epinephrine, norepinephrine, cortisol, and beta-endorphin were measured at various stages during the perioperative period. In addition, cardiovascular and clinical variables were monitored. RESULTS: Concentrations of epinephrine, norepinephrine, and cortisol were significantly lower for dogs administered medetomidine. Concentrations of beta-endorphin did not differ between the 2 groups. Heart rate was significantly lower and mean arterial blood pressure significantly higher in dogs administered medetomidine, compared with values for dogs administered acepromazine. CONCLUSIONS AND CLINICAL RELEVANCE: Results indicate that for preanesthetic medications, medetomidine may offer some advantages over acepromazine with respect to the ability to decrease perioperative concentrations of stress-related hormones. In particular, the ability to provide stable plasma catecholamine concentrations may help to attenuate perioperative activation of the sympathetic nervous system.

Descriptors: acepromazine, inhalation anesthetics, intravenous anesthetics, animals, epinephrine, ovariohysterectomy, dogs, cortisol levels, effects on heart rate, blood pressure, comparative study, stress hormones.

Ward, G.S., D.O. Johnsen, and C.R. Roberts (1974). **The use of CI 744 as an anesthetic for laboratory animals.** *Laboratory Animal Science* 24(5): 732-742. ISSN: 0023-6764.

NAL Call Number: 410.9 P94

Descriptors: dissociative anesthetics, laboratory animals, azepines, drug effects on blood pressure, castration, cats, dogs, drug combinations, thyroidectomy, heart rate, injections, salivation.

Waterman, A.E., M.A. Hashim, and H. Pearson (1995). **Effect of body position on oesophageal and gastric pressures in the anaesthetised dog.** *The Journal of Small Animal Practice* 36(5): 196-200. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Abstract: The effect of body position on lower oesophageal sphincter pressure (LOSP), gastric pressure and barrier pressure (BrP) was investigated in 40 dogs anaesthetised for neutering procedures. The dogs were placed in lateral recumbency followed by dorsal recumbency (group 1) or vice versa (group 2). LOSP decreased significantly in the animals which were positioned initially in lateral recumbency, when they were then placed in dorsal recumbency, while those initially positioned in dorsal recumbency showed no significant change in their LOSP or BrP when their position was altered to lateral recumbency. When the data from both groups were pooled, LOSP and BrP were significantly lower when the dogs were in dorsal compared to lateral recumbency ($P < 0.05$).

Descriptors: anesthesia, diaphragm, dogs, esophagogastric junction, manometry, orchiectomy, ovariectomy, posture, pressure, stomach, thiopental.

Watson, A.D., A. Nicholson, D.B. Church, and M.R. Pearson (1996). **Use of anti-inflammatory and analgesic drugs in dogs and cats.** *Australian Veterinary Journal* 74(3): 203-210. ISSN: 0005-0423.

NAL Call Number: 41.8 Au72

Abstract: Responses (486) were collared from a survey of 5054 Australian veterinarians on their use of anti-inflammatory and analgesic drugs in dogs and cats. Almost all respondents used glucocorticoids (usually prednisolone) to treat allergic, pruritic dermatoses in dogs, while two-thirds also gave fatty acid supplements and one-half used antihistamines. Almost 60% of respondents initially injected a glucocorticoid (frequently a long-acting preparation) when treating inflammatory skin diseases in dogs. More than 90% of respondents used glucocorticoids to treat immune-mediated haemolytic anaemia or thrombocytopenia, and about one-third also gave cytotoxic drugs. Administration of prednisolone on alternate days was generally favoured for long-term enteral steroid therapy. Phenylbutazone was the most preferred treatment for painful or inflammatory musculoskeletal disorders of dogs, but aspirin and pentosan polysulphate were also used widely. Regarding the use of analgesic drugs generally, both narcotic analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) were used more widely in dogs than in cats, but alpha-2 agonists were used similarly in both species. The most commonly used narcotic analgesics were pethidine and buprenorphine in both species, while the NSAIDs used most often were flunixin and dipyrone in dogs and ketoprofen in cats. More than 80% of respondents generally used analgesic drugs with potentially painful surgical procedures, with doses given usually before anaesthetic recovery. Analgesic use rates varied with the condition, ranging from 94% for patients with acute severe trauma, through 60% for cruciate ligament repair and 29% for perineal herniorrhaphy, to about 5% for ovariohysterectomy and dog castration. The three clinical signs most frequently nominated as indicators of pain in dogs and cats were (in descending order) vocalisation, response to handling or palpating the affected area, and mental depression. Other items mentioned frequently were behavioural changes and immobility (in both species), inappetence/anorexia in cats, and altered respiration in dogs.

Descriptors: hemolytic anemia, anti-inflammatory agents, cats, dogs, glucocorticoids, mus-

culoskeletal diseases, pain, postoperative complications, questionnaires, skin diseases, wounds and injuries.

Williams, L.S., J.K. Levy, S.A. Robertson, A.M. Cistola, and L.A. Centonze (2002). **Use of the anaesthetic combination of tiletamine, zolazepam, ketamine, and xylazine for neutering feral cats.** *Journal of the American Veterinary Medical Association* 220(10): 1491-1495. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: anesthesia, feral herds, ketamine, ovariectomy, potency, surgical operations, xylazine, cats.

Williams, L.S., J.K. Levy, S.A. Robertson, A.M. Cistola, and L.A. Centonze (2002). **Use of the anesthetic combination of tiletamine, zolazepam, ketamine, and xylazine for neutering feral cats.** *Journal of the American Veterinary Medical Association* 220(10): 1491-1495. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To evaluate the use of the anesthetic combination tiletamine, zolazepam, ketamine, and xylazine (TKX) for anesthesia of feral cats at large-scale neutering clinics. DESIGN: Original study. ANIMALS: 7,502 feral cats. PROCEDURE: Cats were trapped by their caretakers for a feral cat neutering program from July 1996 to August 2000. The anesthetic combination TKX was injected IM into cats while they remained in their traps. Each milliliter of TKX contained 50 mg of tiletamine, 50 mg of zolazepam, 80 mg of ketamine, and 20 mg of xylazine. Females were spayed by veterinarians, whereas males were castrated by veterinarians or veterinary students. Yohimbine (0.5 mg, IV) was administered at the end of the procedure. Logs were kept of the individual drug doses, signalment of the cats, and any complications encountered. These data were analyzed retrospectively (1996 to 1999) and prospectively (2000). RESULTS: Of the 5,766 cats for which dosing records were complete, 4,584 (79.5%) received a single dose of TKX. The mean initial dose of TKX was 0.24 +/- 0.04 ml/cat, and the total mean dose of TKX was 0.27 +/- 0.09 ml. Overall mortality rate was 0.35% (26/7,502) cats, and the death rate attributable solely to potential anesthetic deaths was 0.23% (17/7,502) cats. CONCLUSIONS AND CLINICAL RELEVANCE: The use of TKX for large-scale feral cat neutering clinics has several benefits. The TKX combination is inexpensive, provides predictable results, can be administered quickly and easily in a small volume, and is associated with a low mortality rate in feral cats.

Descriptors: anesthesia, anti-anxiety agents, cats, castration, spay-neuter clinic, combined anesthetics, mortality rate.

Surgical Techniques

Austin, B., O.I. Lanz, S.M. Hamilton, R.V. Broadstone, and R.A. Martin (2003). **Laparoscopic ovariohysterectomy in nine dogs.** *Journal of the American Animal Hospital Association* 39(4): 391-396. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Abstract: Minimally invasive surgery has been found in humans to reduce pain, incidence of infections, and duration of hospitalization. Minimally invasive procedures are also being described in veterinary medicine. Laparoscopic ovariohysterectomy (OHE) was performed on nine, healthy, intact female dogs using a Harmonic scalpel. Creatine kinase values were determined both before and 12 hours following the laparoscopic OHE; the magnitude of the difference between preoperative and postoperative creatine kinase values did not correlate with length of operative time, length of incisions, or amount of hemorrhage. Complications included one dog that had an omental herniation that was primarily repaired and one dog with seroma formation. Median surgical time for all dogs was 60 minutes (range, 35 to 100 minutes).

Descriptors: animals, dog diseases, female, hysterectomy, laparoscopy, ovariectomy, postoperative complications, veterinary, reference values, minimally invasive surgical procedures, treatment outcome.

Bloomberg, M.S. (1996). **Surgical neutering and nonsurgical alternatives.** *Journal of the American Veterinary Medical Association* 208(4): 517-519. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: age factors, animals, methods of castration, cats, population density.

Bos, M. (2002). **Waltham Award voor evaluatie laparoscopische ovariectomie bij de teef.**

[**Waltham Award for evaluation of laparoscopic ovariectomy in the bitch.**] *Tijdschrift Voor Diergeneeskunde* 127(12): 401-402. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: adrenalectomy, animals, dogs, female, laparoscopy, history and methods of ovariectomy, ovariectomy, history of medicine.

Language of Text: Dutch.

Brugmans, F., S. Thiele, and L. Koehler (1996). **Minimaal invasieve chirurgie door middel van laparoscopische en thoracoscopische technieken. [Minimal invasive surgery using laparoscopic and thoracoscopic techniques].** *Vlaams Diergeneeskundig Tijdschrift* 65(2): 72-81. ISSN: 0303-9021.

NAL Call Number: 41.8 V84

Descriptors: laparoscopy, surgery, techniques, bitches, reviews, endoscopy, horses, dogs.

Language of Text: Dutch, Summary in English.

Brun, M.V., A. Silva Filho de PF da, C.A. Beck, M.B. Mariano, J.R.B. de Mello, C. de Beck CA, A. da Silva, PF de Filho, and J.R.B. de Mello (2000). **Ovario-histerectomia em caninos por cirurgia laparoscopica. [Laparoscopic ovariohysterectomy in canine]**. *Brazilian Journal of Veterinary Research and Animal Science* 37(1-6): 480-485. ISSN: 1413-9596.

Descriptors: bitches, hemorrhage, hysterectomy, laparoscopy, ovariectomy, ovaries, surgery, surgical operations, uterus, dogs.

Language of Text: Portuguese, Summary in English.

Carr, S.H. (1986). **A technique for ovariohysterectomy in the estrous cat**. *Feline Practice* 16(5): 15-16. ISSN: 0046-3639.

NAL Call Number: SF985.F4

Descriptors: cats, estrous cycle, ovariectomy, uterus, surgical operations, female genital system, fur bearing animals, gonadectomy, reproduction, sterilization, surgical operations, urogenital system.

Cela, M. and P. Puntoni (1972). **Su una nuova tecnica operatoria per l'ovariectomia della cagna. [A new technique of ovariectomy in the bitch. (Summary)]**. *Atti Della Societa Italiana Della Scienze Veterinarie* 26: 278-279.

Descriptors: ovariectomy, bitches, surgery, dogs.

Language of Text: Italian; Summary in English and French.

Celo, E.M. and A.B. Agulto (1978). **Sutureless and ligatureless technique of castration in dogs and cats [in the Philippines]**. *Philippine Journal of Veterinary and Animal Sciences* 4(1): 42-52. ISSN: 0115-2173.

Descriptors: castration, techniques, cats, dogs.

Chaffaux, S. and M. Kaiser (1978). **Modification de la technique operatoire de l'ovariectomie chez la chienne. [Modified technique for ovariectomy of the bitch]**. *Recueil De Medecine Veterinaire* 154(10): 823-828. ISSN: 0034-1843.

Descriptors: bitches, surgical operations, females, ovariectomy, surgery, dogs.

Language of Text: French, Summary in English and Spanish.

Chaudhry, N.I. and M. Iqbal (1988). **A simple technique for ovariohysterectomy in the cat**. *Pakistan Veterinary Journal* 8(3): 149-151. ISSN: 0253-8318.

Descriptors: cats, ovariectomy, gonadectomy, pet animals, sterilization, surgical operations.

Csiszar, P. and E. Brath (1997). **Minimally invasive laparoscopic surgery on experimental animal models**. *Acta Chirurgica Hungarica* 36(1-4): 63-64. ISSN: 0231-4614.

Abstract: Our goal was to find a very good model for gynecological laparoscopic operations. The main purpose of the operations was to perform the same types of laparoscopic operations as we use daily in our clinical practice at the Department of Obstetrics and Gynecology. UMMSD. The uterus of female dogs seemed to be ideal for this work. In every experiment we carried out 10 different interventions on identical part of different dog uterus. The operations were performed at identical time period of day (a.m.). The weight of the female dogs were similar. The anaesthesia was also performed the same way in every case. The main purpose of

the operations was to find some significant changes or differences between the 10 different surgical techniques. The histological investigation were carried out with normal microscope and electron microscope.

Descriptors: gynecological laparoscopy, sterilization, surgical procedures, animal models, comparison study, tubal sterilization.

Davidson, E.B., H. David Moll, and M.E. Payton (2004). **Comparison of laparoscopic ovari-hysterectomy and ovariohysterectomy in dogs.** *Veterinary Surgery* 33(1): 62-69. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVES : To evaluate technique, complication rates, postoperative pain scores, and clinical outcomes in dogs after laparoscopic ovariohysterectomy (LOVH) or traditional ovariohysterectomy (OVH). STUDY DESIGN : Prospective clinical trial. ANIMALS OR SAMPLE POPULATION : Thirty-four intact female dogs, weighing 2.4-31 kg. METHODS : LOVH (16 dogs) was performed by ligation of the uterus and ovaries with surgical wire, and then removal by an assisted laparoscopic technique. OVH was performed in 18 dogs. Subjective and objective pain scores were assigned at 0, 2, 8, and 24 hours. Surgical time, complications, and pain and incision scores were evaluated. Dogs were followed for up to 6 months. RESULTS : The mean surgical time for LOVH (120 minutes; range, 47-175 minutes) was significantly longer than for OVH (69 minutes; range, 25-140 minutes). Significantly lower pain scores (subjective, in 2 of 10 categories; objective, in 8 of 10 categories) were identified with LOVH at 1 or more time periods. Surgical complications with LOVH were postoperative fever and anorexia (1 dog), minor splenic (3) or pedicle hemorrhage (4), intermittent vaginal hemorrhagic discharge (1), and suture reaction (3). Surgical complications with OVH were hemorrhage from an ovarian pedicle requiring reoperation (1 dog), dehiscence of the abdominal wall (1), and seroma (1). Anesthetic complications included hypotension in 8 OVH dogs and 1 LOVH dog, and hypothermia in 4 OVH and 9 LOVH dogs. The mean incision scores were lower for LOVH at all time periods. CONCLUSION : LOVH was performed successfully in young nonparous dogs >10 kg. Surgical time and complication rates were greater; however, LOVH postoperative pain scores were <=OVH scores. CLINICAL RELEVANCE : LOVH is a potentially safe surgical alternative to traditional OVH in dogs. Equipment cost and necessity for more than 1 surgeon may limit its usefulness in small animal practice.

Descriptors: laparoscopy, traditional ovariohysterectomy, comparison study, postoperative pain, surgical time, complication rates, techniques, dogs.

Dharmaceelan, S., T.N. Ganesh, and W.P.A. David (2000). **Laparoscopic sterilization in bitches: comparison of three techniques.** *Indian Journal of Veterinary Surgery* 21(2): 65-68. ISSN: 0254-4105.

NAL Call Number: SF604.I45

Descriptors: bitches, hematology, histopathology, laparoscopy, ovariectomy, ovaries, surgical operations, techniques, dogs.

- Durr, U.M. (1979). **Kastrierwinkel: ein hilfsmittel fur die katerkastration. [Device for castrating male cats (practical advice)].** *Kleintier-Praxis* 24(5): 222-223. ISSN: 0023-2076.
NAL Call Number: 41.8 K67
Descriptors: males, postoperative complications, surgical techniques, castration, cats.
Language of Text: German, Summary in English, French and Italian.
- Fischer, A. and D. Graf von Plettenberg (1981). **Anlegen einer skrotalen urethradauerfistel ohne kastration. Operationsbeschreibung. [Application of a permanent scrotal urethra fistula without castration. Description of the surgical technique: Dogs].** *Kleintier Praxis* 26(1): 57-59. ISSN: 0023-2076.
NAL Call Number: 41.8 K67
Descriptors: surgical operations, urethra, fistulation, scrotum, surgery, dogs.
- Gallagher, L.A., L.J. Freeman, S. Trenka Benthin, and D.R. Stoloff (1992). **Laparoscopic castration for canine cryptorchidism.** *Veterinary Surgery* 21(5): 411-412. ISSN: 0161-3499.
NAL Call Number: SF911.V43
Abstract: 27th Annual Meeting, American College of Veterinary Surgeons, November 1992, Miami, Florida.
Descriptors: surgery, endoscopy, laparoscopy, postoperative complications, abscesses, cryptorchidism, castration, dogs.
- Gibson, K.L., A.W. Donald, H. Hariharan, and C. McCarville (1997). **Comparison of two pre-surgical skin preparation techniques.** *Canadian Journal of Veterinary Research: Revue Canadienne De Recherche Vétérinaire* 61(2): 154-156. ISSN: 0830-9000.
NAL Call Number: SF601.C24
Abstract: A one-step iodophor skin preparation solution was compared to chlorhexidine gluconate application as a pre-operative skin preparation method in 100 animals undergoing elective ovariohysterectomy. Pre-operative and intra-operative skin cultures demonstrated no difference in antiseptic efficacy. No animal in the study demonstrated signs of systemic infection, and no adverse local effects from either antiseptic were seen. The iodophor solution evaluated (DuraPrep) is a safe and effective pre-operative skin preparation agent in small animal patients undergoing clean surgical procedures.
Descriptors: anti-infective agents, body temperature, cats, chlorhexidine, dogs, heart rate, hysterectomy, iodophors, ovariectomy, preoperative care, respiration, staphylococcal infections, surgical wound infection.
- Gimbo, A., G. Catone, S. Cristarella, and A. Scirpo (1993). **A new, less invasive, laparoscopic-laparotomic technique for the cryptorchidectomy in the dog.** *Archivio Italiano Di Urologia, Andrologia Organo Ufficiale [Di] Societa Italiana Di Ecografia Urologica e Nefrologica Associazione Ricerche in Urologia* 65(3): 277-281. ISSN: 1124-3562.
Abstract: A new, less invasive technique of cryptorchidectomy in the dog is described. The technique makes use of a laparoscope equipped with a telescope for diagnostic purposes (identification of testicle site); and then of a forceps to grasp the deferent duct and force the testicle through a small, laparotomic incision, 2.5 cm long, in the parapenien site. Variations,

according to the kind of cryptorchidism (bilateral or unilateral, abdominal, inguinal), are also discussed. The operation ends with suturing of the vascular stem of the testicle (resorbable sutures) and orchiectomy. This technique is easy to carry out and has the advantage of not being invasive since it does not involve a median laparotomy preceded by overturning of the penis. Three operations have been performed: two on cases of unilateral cryptorchidism and one on a case of bilateral cryptorchidism.

Descriptors: cryptorchidism surgery, laparoscopy, dogs.

Guevar, P. (1997). **Technique d'ovariectomie chez la chienne par utilisation de clips metalliques [Ovariectomy technique in bitches with the use of metal clips]**. *Pratique Medicale and Chirurgicale De L'Animal De Compagnie* 32(6): 503-506.

Descriptors: ovariectomy, bitches, ovaries, surgery, surgical equipment, surgical operations, female genitalia, dogs.

Language of Text: French; Summary in English.

Hamdane, A., Z. Adamiak, and W. Brzeski (2003). **Laparoscopic ovariectomy of dogs by endoloop suture**. *Indian Veterinary Journal* 80(8): 766-768. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: endoloop suture intracorporeal ligation, laparoscopic ovariectomy, dogs.

Heavner, L.W. Jr. and R.J. Moye (1974). **Bloodless castration of the cat using the electroscalpel and cautery**. *Veterinary Medicine: Small Animal Clinician* 69(12): 1515-1517. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: castration, surgery, cats, electrocoagulation.

Helfand, J.M. (1999). **Alternative neutering technique for consideration**. *Journal of the American Veterinary Medical Association* 215(1): 16. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, methods of orchiectomy, scrotum, surgery, male.

Herron, M.A. and M.R. Herron (1972). **Vasectomy in the cat**. *Modern Veterinary Practice* 53(6): 41-43. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: cats, male, spermatic cord, sterilization, surgery of the vas deferens.

Hummer, R.L. (1975). **Pets in today's society**. *American Journal Of Public Health* 65(10): 1095-1098. ISSN: 0090-0036.

NAL Call Number: 449.9 Am3J

Descriptors: domestic animals, cats, contraception, dogs, population growth, sterilization, zoonoses.

Janssens, L.A.A. and G.H.R.R. Janssens (1991). **Bilateral flank ovariectomy in the dog--surgical technique and sequelae in 72 animals**. *The Journal of Small Animal Practice* 32(5): 249-252. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: bitches, dogs, ovariectomy, sterilization, postoperative complications.

Kirpensteijn, J., R.B. Fingland, J.E. Boyer, G.A. Kennedy, R.D. Klemm, and R.M. DeBowes (1993).

Comparison of stainless steel fascial staples and polypropylene suture material for closure of the linea alba in dogs. *Veterinary Surgery* 22(6): 464-472. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Descriptors: surgery, sutures, laparotomy, dogs.

Knecht, C.D. (1976). **An alternate approach for castration of the dog.** *Veterinary Medicine: Small Animal Clinician* 71(4): 469-473. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: animals, methods of castration, dogs, male.

Krzaczynski, J. (1974). **The flank approach to feline ovariohysterectomy (an alternate technique).**

Veterinary Medicine: Small Animal Clinician 69(5): 572-574. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: castration, cats, female, hysterectomy, methods.

Kumar, A., A.K. Das, and A. Kumar (2002). **Laparoscopic salpingo-oophorectomy using otoscope in pups.** *Indian Veterinary Journal* 79(5): 506-507. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: methods and techniques, neutering method, prepubertal, otoscope.

Lambardt, A. (1975). **Akupunkturanalgesieversuche bei katzen. (Vorläufige Mitteilung). [Experimental acupuncture anaesthesia in the cat (preliminary communication)].** *Praktische Tierarzt* 56(1): 33-36. ISSN: 0032-681X.

NAL Call Number: 41.8 P882

Descriptors: acupuncture, ovariectomy, caesarean section, anesthesia, surgery, cats.

Le Roux, P.H. and L.A. van der Walt (1977). **Ovarian autograft as an alternative to ovariectomy in bitches.** *Journal of the South African Veterinary Association* 48(2): 117-123. ISSN: 0301-0732.

NAL Call Number: 41.8 So8

Abstract: The literature on autotransplantation of the ovary is briefly reviewed with emphasis on the portal vein drainage area as the transplant site. An experiment is reported whereby bitches bearing such grafts were compared to entire and ovariectomised subjects with regard to endocrine status and behaviour. It is concluded that autotransplantation of the ovary to the portal vein drainage area may be a promising method of abolishing oestrus and yet avoiding the eunuchoid syndrome as is seen in ovariectomised subjects.

Descriptors: body weight, castration, dogs, estradiol, hydrocortisone, ovary, portal vein, progesterone, stomach.

Liebich, W. (2001). **Orchiopexy combined with vasectomy and testicular prosthesis as alternatives to castration of the male dog with retained testis: review and three case reports.**

Wiener Tierärztliche Monatsschrift 88(2): 46-53. ISSN: 0043-535X.

NAL Call Number: 41.8 T345

Descriptors: casereports, castration, clinicalaspects, diagnosis, gonadaldisorders, maleanimals, physiopathology, prostheses, surgicaloperations, testes, therapy, vasectomy.

Lopez NA (2002). **Using CO2 lasers to perform elective surgical procedures.** *Veterinary Medicine* 97(4): 302-312. ISSN: 8750-7943.

NAL Call Number: 41.8 M69

Descriptors: carbon dioxide, castration, hysterectomy, lasers, veterinary surgery.

Makady, F.M., M.A. Seleim, and A.S. Saleh (1990). **Open castration in adult male dogs: evaluation of natural ligature of the spermatic vessels.** *Assiut Veterinary Medical Journal* 23(46): 209-212. ISSN: 1012-5973.

Abstract: A castration technique that does not employ suture material for ligation of the spermatic vessels was evaluated. The technique consisted of making a series of surgeon's knots with the severes was deference, in one hand, and the testicular vessels on the other hand. In castration of healthy genitalia. the use of this techniques is highly recommended because this procedure have the advantages of using no suture material and of being rapidly performed with practice.

Descriptors: dogs, surgical operations, male genital system, castration, animal husbandry methods, animal morphology, gonadectomy, sterilization, surgical operations, urogenital system.

Monnet, E. and D.C. Twedt (2003). **Laparoscopy.** *The Veterinary Clinics of North America: Small Animal Practice* 33(5): 1147-1163. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Descriptors: methods and techniques, veterinary medicine, laparoscopy, clinical techniques, diagnoses.

Noffsinger, G.R. and M.G. Carbone (1978). **Nonabdominal approach to castration of the cryptorchid cat.** *Journal of the American Veterinary Medical Association* 173(3): 303-304. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, castration, cat diseases, cats, cryptorchidism, male.

Nudelmann, N. (1996). **La laparoscopie chez les carnivores domestiques. Actes chirurgicaux par abord unique [Laparoscopy in domestic carnivores. Surgical acts if a one-off type].** *Recueil De Medecine Veterinaire* 172(11-12): 643-652. ISSN: 0034-1843.

NAL Call Number: SF604.A77

Descriptors: coelioscopy, surgical technique, ovariectomy, crytorchiectomy, dogs, cats, abdomen, endoscopy, ovariectomy, testes, extirpation, gonadectomy, animal glands.

Language of Text: French; Summary in English and French.

Nudelmann, N. (1996). **Laparoscopy in domestic carnivores: surgical acts if a one-off type.** *Recueil De Medecine Veterinaire De L'Ecole D'Alfort* 172(11-12): 643-652. ISSN: 0034-1843.

Descriptors: veterinary medicine, abdominal cavity, cryptorchidectomy, endoscopy, imaging method, laparoscopy, ovariectomy, radiology, surgery, surgical method.

Nudelmann, N., L. Boulouha, A. Rousseau, and B. Siliart (1998). **Degenerescence testiculaire par devascularisation. Application chirurgicale pratique chez le chien. [Testicular degeneration by devascularization. Practical surgical application in the dog].** *Recueil De Medecine Veterinaire* 174(7-8): 133-139. ISSN: 0034-1843.

Descriptors: dogs, males, testes, castration, abdomen, endoscopy, animal glands, animal husbandry methods, body parts, body regions, gonadectomy, male genital system, sex, sterilization, surgical operations, urogenital system.

Language of Text: Summaries in English and Spanish.

O'Boyle, M.A. and G.K. Vajda (1975). **Acupuncture anesthesia for abdominal surgery.** *Modern Veterinary Practice* 56(10): 705-707. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: abdomen, acupuncture therapy, anesthesia, castration, dogs, female, hysterectomy, male.

Okamoto, Y., S. Minami, K. Kato, and A. Matsushashi (1998). **Laparoscopy-assisted ovariohysterectomy in dogs and cats.** *Journal of the Japan Veterinary Medical Association* 51(2): 91-94. ISSN: 0446-6454.

Descriptors: laparoscopy, castration, surgery, ovaries, uterus, laparotomy, female animals, ovariectomy, hysterectomy, cats, dogs.

Pettit, G.D. (1981). **There's more than one way to castrate a cat.** *Modern Veterinary Practice* 62(9): 713-716. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: animals, castration, cats, male.

Phillips, J.T. and E.B. Leeds (1976). **A closed technique for canine orchiectomy.** *Canine Practice* 3(4): 23-26. ISSN: 0094-4904.

NAL Call Number: SF991.A1C3

Descriptors: castration, veterinary surgery, dogs.

Puntoni, P., M. Cela, and F. Morgantini (1973). **L'impeigo di una nuova tecnica nell'ovariectomia della cagna [Use of a new technique in ovariectomy in the dog].** *Annali Della Facolta Di Medicina Veterinaria Di Pisa* 25: 45-49. ISSN: 0365-4729.

Descriptors: bitches, ovariectomy, surgery, dogs.

Language of Text: Italian; Summary in English and French.

Rickards, D.A. (1975). **A castration technique before feline perineal urethrostomy: photographic essay.** *Feline Practice* 5(4): 37-38. ISSN: 0046-3639.

NAL Call Number: SF985.F4

Descriptors: perineal urethrostomy, surgical time, The Cleveland Technique, scrotum castration, surgery, cats.

Rochat, M.C., F.A. Mann, and J.N. Berg (1993). **Evaluation of a one-step surgical preparation technique in dogs.** *Journal of the American Veterinary Medical Association* 203(3): 392-395. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: The efficacy of a 1-step surgical preparation technique for skin of dogs prior to elective ovariohysterectomy was evaluated. Dogs randomly assigned to group 1 (n = 30) had their skin prepared for surgery by use of a 2-step method, whereas the skin of dogs in group 2 (n = 30) was prepared for surgery by use of a commercially available product for a 1-step technique. Culture plates for quantitative bacterial counts were applied to the proposed incision site on dogs under general anesthesia after hair at the site was clipped and vacuumed but before antiseptic was applied. A second quantitative bacterial culture plate was applied to the proposed incision site after completion of the surgical preparation technique. Surgeries were routinely completed, and dogs were evaluated by physical examination the next day and at the time of suture removal (7 to 10 days after surgery) for complications. Postoperative complications were minor and consisted primarily of subcutaneous swelling, which resolved with time. All cultures obtained prior to skin preparation included bacteria or yeast. Sixteen cultures obtained after skin preparation (group 1, n = 11; group 2, n = 5) included bacteria or yeast. The total number of colonies of potential pathogens (*Staphylococcus* sp and Enterobacteriaceae) on the preparation cultures was 9,339; 4 colonies were counted on the postpreparation cultures. Potential bacterial pathogens, ie *Streptococcus intermedius* and gram-negative bacteria, were isolated from dogs prepared with the 2-step technique.

Descriptors: bacteria, microbial colony count, dogs, evaluation studies, hysterectomy, veterinary, ovariectomy, povidone iodine, preoperative care, elective surgical procedures, surgical wound infection.

Rocken, F.E., E. Lettow, and K.F. Gerlach (1994). **Die Kastration des Ruden mit Resektion des Skrotums. Operationstechnik und Ergebnisse bei 274 Patienten.** [The castration of the male dog with resection of the scrotum. Technique and results in 274 patients]. *Kleintier-Praxis* 39(6): 407-408, 413-415. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: surgery, postoperative complications, dog diseases, scrotum, castration, surgical operations, dogs.

Language of Text: English, French.

Sgorbini M, Rota A, Melanie P, and Aria G (2002). **Queen mini-invasive sterilization by means of "ovariectomy-hook".** *Praxis Veterinaria Milano* 23(2): 23-27.

Descriptors: ovariectomy, queens, sterilization, surgery, surgical instruments, surgical operations, uterus.

Shyu JeouJong, Liu PanChen, J.J. Shyu, and P.C. Liu (1998). **Castration of male dogs using laparoscopic electro-coagulation.** *Journal of the Chinese Society of Veterinary Science* 24(3): 169-178. ISSN: 0253-9179.

NAL Call Number: SF604.C54

Descriptors: castration, male animals, laparoscopy, surgery, testes, spermatozoa, semen, male genitalia, epididymis, dogs.

Siegl, H., R. Bohm, J. Ferguson, M. Friedrich, and U.M. Losert (1994). **Laparoskopische ovariohysterektomie bei einem hund [Laparoscopic ovariohysterectomy in a bitch]**. *Wiener Tierärztliche Monatsschrift* 81(5): 149-152. ISSN: 0043-535X.

NAL Call Number: 41.8 T345

Descriptors: surgical operations, techniques, experimental surgery, ovariectomy, dogs.

Language of Text: German; Summary in English.

Stansbury, R.L. (1971). **A castration technique**. *Feline Practice* 1(1): 20-22. ISSN: 0046-3639.

NAL Call Number: SF985.F4

Descriptors: castration, surgery, cats

Sugano, H. (1984). **Modification of a subcuticular buried suture for ovariectomy in cats and dogs**. *Journal of the Japan Veterinary Medical Association* 37(10): 639-643. ISSN: 0446-6454.

Descriptors: ovariectomy, surgery, dogs, cats, suture technique.

Sylvestre, A., J. Wilson, and J. Hare (2002). **A comparison of 2 different suture patterns for skin closure of canine ovariohysterectomy**. *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 43(9): 699-702. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Abstract: The purpose of this study was to compare postoperative wound healing in canine ovariohysterectomy following the use of an absorbable monofilament poliglecaprone 25 suture in 2 different skin closure techniques, the buried continuous subcuticular (BCS) suture pattern and the simple interrupted (SI) suture pattern. These 2 skin closure techniques were evaluated against a nonabsorbable polypropylene monofilament suture in an SI pattern. Wounds were assessed by using a semiquantitative scoring system at 18 to 24 hours and 10 to 14 days, postoperatively. Results indicated that the BCS closure using poliglecaprone 25 demonstrated a higher rate of tissue reactivity initially (18-24 hours postoperatively), as compared with the SI closure using either suture material. By 10 to 14 days postoperatively, poliglecaprone 25 used in a BCS closure was associated with significantly lower wound scores than was the same material used in an SI closure. It was concluded that the BCS closure may effect a better cosmetic appearance to the skin closure in a canine ovariohysterectomy at the time of the recheck appointment. Furthermore, by obviating the need for suture removal, use of the BCS pattern may eliminate the requirement for this return appointment.

Descriptors: comparative study, dogs, ovariohysterectomy, skin closure techniques, wound scores, skin closure, wound healing.

Tesson, B. (1982). **Utilisation des clips hemostatiques dans l'ovario-hysterectomie de la chienne et de la chatte. [Use of haemostatic clips in ovaro-hysterectomy in the dog and cat]**. *Bulletin Des Groupements Techniques Veterinaires* 3: 5-8.

Descriptors: ovariectomy, surgical instruments, dog, cat, veterinary science

Thiele, S., G. Kelch, and K.G. Frank (1996). **Endoskopie der Körperhöhlen und minimal invasive Chirurgie (MIC) bei Kleintieren - Übersichtsreferat. [Endoscopy of body cavities and minimal invasive surgery in dogs - survey article]**. *Berliner Und Munchener Tierärztliche Wochenschrift* 109(8): 288-291. ISSN: 0005-9366.

Descriptors: body cavities, surgery, diagnostic techniques, reviews, castration, endoscopy, dogs.

Language of Text: German; Summary in English.

Thiele, S., G. Kelch, and K. Gerlach (1993). **Kastration der Hundin durch laparoskopische Ovarektomie.** [Castration of the bitch by means of laparoscopic ovariectomy]. *Kleintier-Praxis* 38(7): 463-466. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: surgery, ovaries, reproduction, ovariectomy, bitches, dogs.

Language of Text: German; Summary in English and French.

Valocky, I., S. Paiss, and I. Maracek (1999). **Methods of laparoscopic sterilization of bitches.** *Veterinarni Medicina* 44(9): 269-273. ISSN: 0375-8427.

Descriptors: bitches, sterilization, abdominal cavity, complications, German Shepherd, laparoscopy, ligature, ovariectomy, ovaries, oviducts, surgery, sutures, techniques, dogs.

Language of Text: Slovakian.

Van Goethem, B.E., K.W. Rosenveldt, and J. Kirpensteijn (2003). **Monopolar versus bipolar electrocoagulation in canine laparoscopic ovariectomy: a nonrandomized, prospective, clinical trial.** *Veterinary Surgery* 32(5): 464-470. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVE: To compare the effect of using monopolar (MEC) or bipolar electrocoagulation (BEC) on surgical time for laparoscopic ovariectomy in dogs and to evaluate the influence of age, weight and obesity, and estrus or pseudopregnancy on surgical time. STUDY DESIGN: Prospective, nonrandomized, clinical trial. ANIMALS: One hundred three female dogs. METHODS: Laparoscopic ovariectomy was performed with MEC or BEC by 1 surgeon using a standard protocol. Surgical time was recorded for the different procedural stages and was statistically evaluated for differences between MEC and BEC (chi(2), Student t test, and ANOVA). The influence of significant variables was analyzed using multiple linear regression analysis. RESULTS: Mean surgical time was 47 minutes (range, 27 to 110 minutes). With BEC, surgical time was significantly shorter (41 minutes; P <.001) than with MEC (53 minutes). Obesity (56 vs. 42 minutes; P <.001) and intraoperative mesovarial bleeding (56 vs. 46 minutes; P =.03) increased surgical time. Dog age, estrus, and pseudopregnancy did not significantly influence surgical time. CONCLUSIONS: BEC decreased laparoscopic ovariectomy time, decreased intraoperative hemorrhage, and, with the technique used, facilitated exteriorization of the ovaries. CLINICAL RELEVANCE: Laparoscopic ovariectomy can be performed more rapidly when using BEC instead of MEC and with less risk of mesovarial hemorrhage.

Descriptors: dogs, comparative study, electrocoagulation, laparoscopy, ovariectomy.

Vannozi, I., G. Barsotti, and A. Rota (1999). **Ovariectomia mini invasiva nella cagna: note preliminari.** [Minimally invasive ovariectomy in bitches: preliminary report]. *Annali Della Facolta Di Medicina Veterinaria Di Pisa* 52: 317-327. ISSN: 0365-4729.

Descriptors: bitches, ovariectomy, laparoscopy, veterinary surgery, dogs.

Language of Text: Italian; Summary in English.

Whitney, G.D. (1982). **Use of implanted nylon bands in surgical procedures.** *Canine Practice* 9(1): 24, 28-30. ISSN: 0094-4904.

NAL Call Number: SF991.A1C3

Descriptors: veterinary surgery, ovariectomy, postoperative complications, ligature, dogs, cats.

Whyte, J., R. Sarrat, A. Torres, A. Cisneros, A. Whyte, R. Mazo, and E. Aranda (1999). **Vasectomia experimental: comparacion de la estructura del epididimo mediante diferentes tecnicas quirurgicas.** [Experimental vasectomy: Comparison of the epididymal structure by means of different surgical techniques]. *Archivos Espanoles De Urologia* 52(9): 915-921. ISSN: 0004-0614.

Abstract: **OBJECTIVE:** To analyze the effects of different surgical techniques of vasectomy on the epididymal structure. **METHODS:** Experimental vasectomies were performed in dogs using the conventional and open-ended techniques. The animals were orchidectomized 1 to 12 months after vasectomy and the epididymal structure was analyzed. **RESULTS:** The epididymal structure of dogs submitted to the conventional technique showed marked ectasia, reinforced basement membrane, loss of stereocilia in the principal cells, and formation of spermatic granulomas in interstitial tissue. At 12 months the principal cells showed signs of degenerative changes. In the different time periods analyzed in the study, no changes were observed in the epididymal structure of dogs submitted to the open-ended technique. **CONCLUSIONS:** The changes observed in the principal cells are ascribable to the increased intraluminal pressure produced by ligation of both ends of the vas deferens (conventional technique), since no changes were found in the epididymal structure of dogs submitted to the open-ended technique, at least in the different time periods analyzed in the study. Article in Spanish.

Descriptors: epididymis, vasectomy methods, dogs, spermatic granuloma, open-ended technique.

Language of Text: Spanish; Summary in English.

Wildt, D.E. and D.F. Lawler (1985). **Laparoscopic sterilization of the bitch and queen by uterine horn occlusion.** *American Journal of Veterinary Research* 46(4): 864-869. ISSN: 0002-9645. **NAL Call Number:** 41.8 Am3A

Abstract: Laparoscopic sterilization techniques, originally developed for use in women, were evaluated in the bitch and queen. In the first study (study I), the uterine horns of 6 bitches and 3 queens were occluded by electrocoagulation or plastic clips. The sites of occlusion were midway along the length of 1 cornus and at the uterotubal junction on the contralateral side. Both procedures effectively occluded the uterine horns, as evidenced by a distinctly visible separation of the reproductive tract. Laparoscopic examination 1 year after surgery revealed an enlarged, thin-walled, and fluid-filled uterine segment cranial to the midcornus occlusion sites in all animals. The contralateral horn was normal in appearance, except for the separation from the ovarian bursa. Three of the bitches developed pyometra (confined to the distended uterine segment) at 24 months, at 53 months, and at 72 months after sterilization, respectively. In a subsequent study (study II), 1 adult and 5 prepubertal bitches were sterilized by laparoscopic electrocoagulation of both uterine horns at the uterotubal junction adjacent to the ovarian bursa. Upon reexamination 1, 2, and 4 years later, the uterine horns

of these females were normal in appearance, but were separated from the adjacent ovarian bursae. These females continued to be clinically healthy. Laparoscopic sterilization offers a rapid and safe alternative to ovariohysterectomy and, because of its minor invasive nature, can be performed on young, prepubertal animals. Such a procedure may have particular value as a simple, practical means of sterilizing dogs and cats on a mass basis.

Descriptors: cats, dogs, electrocoagulation, female, laparoscopy, ligation, postoperative complications, sterilization, uterus.

Wildt, D.E., S.W. Seager, and C.H. Bridges (1981). **Sterilization of the male dog and cat by laparoscopic occlusion of the ductus deferens.** *American Journal of Veterinary Research* 42(11): 1888-1897. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: cats, dogs, electrocoagulation, laparoscopy, spermatozoa, reproductive sterilization, males.

Willimzik, H.F. and K.O. Weber (1992). **Diskussionsbeitrag zum Verschluss der die Ovarien versorgende Gefasse bei der Kastration der Katze. [Electrocoagulation sealing of ovarian blood vessels during ovariectomy of cats].** *Kleintier-Praxis* 37(8): 539-540. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: surgical operations, techniques, hemostasis, ovariectomy, cats.

Language of Text: German; Summary in English and French.

Wissler, K., S. Zindel, K. Nager, and M. Berchtold (1983). **Verhinderung von unerwünschten Kastrationsfolgen bei der Hundin durch Transplantation von autologem Ovargewebe. [Prevention of unwanted consequences of castration (ovariectomy or ovariohysterectomy) in the bitch through transplantation of autologous ovarian tissue].** *Zentralblatt Fur Veterinarmedizin, Reihe A* 30(6): 470-481. ISSN: 0514-7158.

Descriptors: ovaries, postoperative care, adverse effects, gonadectomy, dogs.

Language of Text: Summary in English, Spanish, French.

Young, W.P. (2002). **Feline onychectomy and elective procedures.** *The Veterinary Clinics of North America Small Animal Practice* 32(3): 601-619. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Descriptors: radiology, carbon dioxide, laser medical equipment, elective laser surgery, laser castration surgical method, laser onychectomy.

Zagraniski, M.J. (1978). **Ovariohysterectomy of the estrous queen utilizing nylon cable tie bands.** *Feline Practice* 8(4): 47-50. ISSN: 0046-3639.

NAL Call Number: SF985.F4

Descriptors: hysterectomy, ovariectomy, surgery, cats.

Chemical Sterilization

- Anonymous (1975). **Contraceptive technology in controlled reproduction in pets.** *American Journal of Public Health* 65(1): 77-78. ISSN: 0090-0036.
NAL Call Number: 449.9 Am3J
Descriptors: animals, cats, contraception, dogs, veterinary medicine.
- Bloomberg, M.S. (1996). **Surgical neutering and nonsurgical alternatives.** *Journal of the American Veterinary Medical Association* 208(4): 517-519. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: age factors, animals, methods of castration, cats, population density.
- Burke, T.J. (1977). **Fertility control in the cat.** *The Veterinary Clinics of North America* 7(4): 699-703. ISSN: 0091-0279.
NAL Call Number: SF601.V523
Descriptors: cats, castration, contraception, estrus, hysterectomy, megestrol, nandrolone, vasectomy, endometritis.
- Concannon, P.W. and V.N. Meyers-Wallen (1991). **Current and proposed methods for contraception and termination of pregnancy in dogs and cats.** *Journal of the American Veterinary Medical Association* 198(7): 1214-1225. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: induced abortion, cats, methods of contraception, dogs, embryo implantation, megestrol acetate.
- Dixit, V.P. (1977). **Action of monochlorohydrin on epididymis of dog.** *Indian Journal of Experimental Biology* 15(3): 233-235. ISSN: 0019-5189.
NAL Call Number: 442.8 IN2
Descriptors: castration, chlorohydrins, dogs, epididymis, ligation, male, alpha chlorohydrin.
- Dixit V. P. (1986). **Antifertility effects of solasodine (C₂₇ H₄₃ O₂ N) obtained from solanum-xanthocarpum berries in male rats and dogs.** *Journal of Steroid Biochemistry* 25(Supplement): 27. ISSN: 0022-4731.
NAL Call Number: QD426.A1J6
Descriptors: abstract, oral administration, rats, dogs, infertility, inhibition of spermatogenesis and sperm motility, solasodine, plant origin, inhibition of testosterone release.
- Dixit, V.P. (1977). **Chemical sterilization of male dogs: synergistic action of alpha-chlorohydrin (U-5897) with danazol on the testes and epididymides of dog.** *Acta Europaea Fertilitatis* 8(2): 167-173. ISSN: 0587-2421.
Descriptors: animals, chlorohydrins, danazol, dogs, drug synergism, epididymis, leydig cells, organ weight, pregnadienes, sterilization, alpha chlorohydrin.

Dixit, V.P. and S.K. Bhargava (1983). **Reversible contraception like activity of embelin in male dogs (*Canis indicus* Linn).** *Andrologia* 15(5): 486-494. ISSN: 0303-4569.

NAL Call Number: QP253.A5

Abstract: In order to evaluate the long term metabolic effect of embelin on the testes, adult male dogs were fed with embelin (80 mg/kg b.w. each other day) for 100 days. Loss in weights of testes and spermatogenic elements was noticed. The epididymides were devoid of spermatozoa but the functional morphology remain unaltered. 250 days of recovery period brings about normal spermiogenesis with all 1-8 cell stages. Epididymal milieu showed functional physiology. A three tiered finding accompanying histology, tissue biochemistry and blood/serum profile of dogs treated with embelin showed that 100 days therapy inhibits spermatogenesis, whereas 250 days recovery restores it. Sexual potency and libido of the animals did not change. A reversible male contraception with the help of a plant benzoquinone (embelin) is promising.

Descriptors: oral contraceptives, benzoquinones, embelin, dogs, reversible contraception, males, testis weight, spermatogenesis.

Dixit, V.P., C.L. Gupta, and M. Agrawal (1977). **Testicular degeneration and necrosis induced by chronic administration of cannabis extract in dogs.** *Endokrinologie* 69(3): 299-305. ISSN: 0013-7251.

NAL Call Number: QP187.A1E53

Abstract: 1. Daily administration of cannabis extract (12.5 mg/kg body wt. for 30 days) produced a complete arrest of spermatogenesis in dogs. Distinct degenerative effects were produced in the form of extensive fibrosis and exfoliation of the seminiferous elements. 2. RNA, protein and sialic acid contents of the testis and epididymides were reduced after cannabis extract administration, whereas, testicular cholesterol and enzyme phosphatase were elevated. 3. Serum transaminases were slightly elevated, whereas the alkaline phosphatase and haemoglobin/haematocrit values were in normal range. 4. Histophysiological examination of the liver did not show any damage. 5. Reduced androgen production was reflected in low levels of sialic acid in the testis and epididymides, and shrunken Leydig cell nuclei and luminal epididymal epithelium. 6. In conclusion: Cannabis extract at 12.5 mg/kg body wt. dose level did not cause severe damage to the vital organs but it produced an effective inhibition of spermatogenesis in male dogs in 30 days and thus induces an antifertility state. The possibility of an adverse effect of frequent marihuana use on male reproductive organ functioning in man is alarming.

Descriptors: inhibition of spermatogenesis, cannabis, degenerative effects, anti-fertility state, animal models, dogs.

Dixit, V.P. and N.K. Lohiya (1975). **Chemical sterilization: effects of a single high dose of 3-chloro-1,2-propanediol on the testes and epididymides of dog.** *Acta Europaea Fertilitatis* 6(1): 57-62. ISSN: 0587-2421.

Abstract: A single high dose (70 mg/kg) of 3-chloro-1,2-propanediol (alpha-chlorohydrin) caused pathological degeneration in the testes of dog when examined after 33 days. The seminiferous tubules were depleted of spermatogenic elements. Epididymal epithelium was regressed, the lumen was empty and the passage through the duct was unimpaired. Alpha-

chlorohydrin inhibited the synthesis of RNA and sialic acid of the testes and epididymides. A single high dose of alpha-chlorohydrin increased the total cholesterol/g of wet testis tissue which could be correlated with the testicular atrophy. Antiandrogenic nature of the compound has been discussed.

Descriptors: chlorohydrins, cholesterol, dogs, epididymis, leydig cells, male, biosynthesis of RNA, sialic acid, spermatogonia, sterilization, alpha chlorohydrin.

Dixit, V.P., N.K. Lohiya, and M. Agawal (1975). **Effects of alpha-chlorohydrin on the testes and epididymides of dog: a preliminary study.** *Fertility and Sterility* 26(8): 781-785. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Abstract: Chronic administration of alpha-chlorohydrin (8 mg/kg for 30 days, caused lesions in the testis of dog. Seminiferous tubules presented marked degenerative changes. Leydig cell hypertrophy was conspicuous. Epididymal epithelium was regressed and the lumen was devoid of spermatozoa. Obstruction of the epididymal lumen was not seen. Alpha-chlorohydrin inhibited the synthesis of RNA and sialic acid in the testis, caput epididymis, corpus epididymis, and cauda epididymis. The total cholesterol per gram of testis was increased significantly after alpha-chlorohydrin administration. The anti-androgenic nature of alpha-chlorohydrin is suggested.

Descriptors: anti-fertility, chlorohydrins, dogs, spermatozoa, drug effects on spermatogenesis, seminiferous tubules, anti-androgenic.

Dixit, V.P., N.K. Lohiya, M. Arya, and M. Agrawal (1975). **Chemical sterilization of male dogs after a single intra-testicular injection of "Danazol".** *Folia Biologica* 23(3): 305-310. ISSN: 0015-5497.

NAL Call Number: 442.8 F71

Descriptors: 17-a-ethinyl testosterone, intratesticular injection, testes effects, RNA synthesis inhibitor, sialic acid depletion, dogs, testicular atrophy, increase in testicular lipids and cholesterol.

Fahim, M.S., Z. Fahim, J. Harman, I. Thompson, J. Montie, and D.G. Hall (1977). **Ultrasound as a new method of male contraception.** *Fertility and Sterility* 28(8): 823-831. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Abstract: Twenty male cats were treated once or twice with 1 watt/sq cm of ultrasound for 10 minutes. Each of 24 male dogs received one to three treatments with 1 watt/sq cm for 10 minutes. Another six dogs were treated with 2 watts/sq cm for 15 minutes. Four Cebus apella monkeys were treated with the same dosage as that used for the cats and dogs. A dosage of 1 watt/sq cm for 10 minutes was also applied to four human patients without the use of anesthetics, and no pain or side effects were noted. In all treated animals as well as in human patients the results indicate that ultrasound significantly suppresses spermatogenesis according to the dosage and frequency of treatment, without any effect on Leydig cells or blood testosterone levels.

Descriptors: cats, methods of contraception, dogs, Haplorhini, cebus monkeys, rats, seminiferous tubules, spermatogenesis, temperature, ultrasonics.

Fahim, M.S., M. Wang, M.F. Sutcu, Z. Fahim, and R.S. Youngquist (1993). **Sterilization of dogs with intra-epididymal injection of zinc arginine.** *Contraception* 47(1): 107-122. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: Condoms and vasectomy are the only fertility control methods available to males. Fifty million surgical vasectomies have been performed worldwide. In spite of improvements in the surgical techniques, the widespread use of vasectomy is limited due mainly to fear of genital operation. Chemical sterilization offers a promising new approach as an alternative to surgery. Fifteen sexually mature, mixed breed, male dogs, 2-3 1/2 years of age and weighing 22 +/- 1.8 kg, were divided into two groups. Five control placebo animals were injected with 0.5 ml of saline into the cauda epididymis, and ten treated animals were injected with 0.5 ml of 50 mg of zinc arginine into the cauda epididymis. Semen analysis performed before injection showed no significant difference between control placebo and treated groups. The control placebo animals exhibited a significant reduction in sperm motility one month after injection, which returned to normal within two months, and no change in semen volume, sperm abnormalities, or sperm concentration analyzed monthly for twelve months. The zinc arginine-treated animals achieved azoospermia ninety days after injection. The dogs were sacrificed one year after injection. There was no significant reduction of reproductive organ weights of the treated group as compared to the control placebo group. Although histological examination of the testes revealed normal seminiferous tubules, there was atrophy of the rete testes of the zinc arginine-treated group and, thus, increase in connective tissue. Histological examination of epididymides of the zinc arginine-treated group indicated that none of the cells in the head, body, and tail of the epididymis and ductus deferens contained sperm; 90% of the coils were empty and 10% contained amorphous pink cell debris; the coils decreased in diameter and were lined by cuboidal to columnar epithelium; no granuloma was observed. There was no significant change in serum testosterone level of control placebo and treated groups. These results offer the possibility of a new method of permanent sterilization instead of surgery. Zinc is considered to be nonmutagenic, noncarcinogenic, and nonteratogenic.

Descriptors: vasectomy, chemical sterilization, canine model, reduced sperm motility, zinc arginine, permanent sterilization alternative, serum testosterone.

Fayrer Hosken R. (2003). **Contraceptive techniques for male dogs and cats.** In: Root Kustritz M.V. (editor), *Small Animal Theriogenology*, Butterworth Heinemann: St. Louis, p. 447-456. ISBN: 0-7506-7408-3.

Descriptors: castration, contraceptives, epididymis, GnRH, males, estrogens, progestogens, reproduction, veterinary surgery, testes, vasectomy.

Fischer, A. and D. Graf von Plettenberg (1981). **Anlegen einer skrotalen urethradauerfistel ohne kastration. Operationsbeschreibung. [Application of a permanent scrotal urethra fistula without castration. Description of the surgical technique: Dogs].** *Kleintier Praxis* 26(1): 57-59. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: surgical operations, urethra, fistulation, scrotum, surgery, dogs

Freeman, C. and D.S. Coffey (1973). **Sterility in male animals induced by injection of chemical agents into the vas deferens.** *Fertility and Sterility* 24(11): 884-890. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Descriptors: cadaver, dogs, ethanol, formaldehyde, granuloma, ligation, sclerosing solutions, sterilization, adverse effects of vasectomy.

Galliani, G., A. Assandri, L. Gallico, F. Luzzani, C. Oldani, A. Omodei Sale, A. Soffientini, and G. Lancini (1981). **A new non-hormonal pregnancy-terminating agent.** *Contraception* 23(2): 163-180. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: DL 111-IT, 3-(2-ethylphenyl)-5-(3-methoxyphenyl)-1H-1,2,4 triazole, a compound belonging to a new class of non-hormonal antifertility agents, when given subcutaneously, intramuscularly, intravaginally or orally terminates pregnancy in the rat, the mouse, the hamster and the dog. Time-course and dose-activity studies indicate that its effectiveness is dependent on dose, vehicle, route and time of pregnancy. DL 111-IT has no pre-implantation activity. The most effective time for treatment is the early post-implantation period. The compound has an antifertility effect through a slow and continuing action that results in the degeneration and subsequent resorption or expulsion of conceptuses. As a result, there must be sustained availability of active principle to arrest the pregnancy. Administered parenterally in a proper vehicle (oily) and with a suitable schedule of treatment (x 2-5 days), it demonstrates a very high pregnancy terminating activity (ED50: 0.04-0.7 mg/kg/day). Multiple intravaginal and oral administrations are also effective but the daily doses required are 10-20 and 40-100 times higher than the parenteral ones. Studies of the mechanism of action indicate that the site of action is the utero-placental complex. In fact, in pregnant rats, mice, hamsters and dogs, both plasma progesterone levels and the ineffectiveness of progesterone therapy rule out luteolysis as a basis for the activity. Moreover in hypophysectomized, ovariectomized animals whose pregnancies were maintained with proper hormonal treatments, DL 111-IT terminates pregnancy and adrenalectomy does not prevent its effect, which suggests that pituitary, ovaries and adrenals are not required for the antifertility action.

Descriptors: abortifacient agents, castration, dogs, dose response relationship, hamsters, hypophysectomy, mice, progesterone, rats.

Ghanawat, H.G. and M.B. Mantri (1996). **Comparative study of various approaches for ovari-hysterectomy in cats.** *Indian Veterinary Journal* 73(9): 987-988. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: cat diseases, surgery, techniques, ovariectomy, hysterectomy, cats.

Goodpasture, J.C., M.B. Hiller, B. Lewis, K.A. Walker, and B.H. Vickery (1987). **Same day appearance of orally administered, spermicidal 1-substituted imidazoles in dog ejaculates.** *Journal of Andrology* 8(4): 230-237. ISSN: 0196-3635.

NAL Call Number: QP253.J6

Abstract: Within hours after administration of high oral doses of ketoconazole to males of various species, the intact compound appears in the seminal plasma, leading to immobilization of spermatozoa in ejaculates collected several hours later. The present report describes in vitro and in vivo characterization studies of several new compounds identified from a series of 1-substituted imidazole compounds. Relative rank order of in vitro potencies of the four compounds studied was RS-29984 greater than RS-90847 greater than RS-41353 greater than RS-68287. Oral administration of single doses of these compounds ranging between 10 and 95 mg/kg, followed by ejaculation of the animals at various times after dosing, showed that their relative potencies for decreasing sperm motility were RS-41353 greater than RS-68287 = RS-90847 greater than RS-29984. Four hours after animals were given 30 mg/kg of RS-41353, spermatozoa in the ejaculates had zero forward progression within 30 to 40 minutes after the start of ejaculation. A preliminary metabolic study indicated that the apparently greater potency of RS-68287 in vivo than in vitro was probably not due to metabolic activation. The androgen-suppressing activity of RS-29984 and RS-90847 was shown to be less than that of ketoconazole. These data indicate that orally active inhibitors of sperm motility that exert their effects after ejaculation may be feasible, and suggest that this novel approach to male contraception warrants further investigation.

Descriptors: immobilization of spermatozoa, male contraception, dogs, ejaculation, imidazoles, ketoconazole, spermatocidal agents.

Gupta, R.S. and V.P. Dixit (2002). **Effects of short term treatment of solasodine on cauda epididymis in dogs.** *Indian Journal of Experimental Biology* 40(2): 169-173. ISSN: 0019-5189.

NAL Call Number: 442.8 IN2

Abstract: Oral administration (80 mg/kg body wt/day for 30 days) of solasodine (extracted and isolated from the berries of the *Solanum xanthocarpum*) to intact dogs significantly decreased the epithelial cell height of cauda epididymides. The cells became atrophic and the lumen was devoid of spermatozoa. Castration followed by the administration of solasodine further reduced the epithelial cell height in comparison to castrated controls. Concurrent treatment of solasodine along with testosterone propionate was unable to restore the normal epithelial lumen parameters. Total protein, sialic acid, glycogen and acid phosphatase activities were significantly reduced in solasodine treated cauda epididymides. These results suggest antiandrogenic potency of solasodine.

Descriptors: pharmacology, castration, dogs, solasodine, anti-androgen.

Hummer, R.L. (1975). **Pets in today's society.** *American Journal Of Public Health* 65(10): 1095-1098. ISSN: 0090-0036.

NAL Call Number: 449.9 Am3J

Descriptors: domestic animals, cats, contraception, dogs, population growth, sterilization, zoonoses.

Jackson, E.K. (1984). **Contraception in the dog and cat.** *The British Veterinary Journal* 140(2): 132-137. ISSN: 0007-1935.

NAL Call Number: 41.8 V643

Descriptors: castration, cats, methods of contraception, contraceptive agents, estrus, tubal sterilization, pregnancy, dogs.

Jochle, W. (1976). **Neuere Erkenntnisse über die Fortpflanzungsbiologie von Hund und Katze: Konsequenzen für die Ostruskontrolle, Konzeptionsverhütung, Abortauslösung und Therapie** [New findings on the physiology of reproduction in the dog and cat: consequences for the control of estrus, contraception abortion and therapy]. *Deutsche Tierärztliche Wochenschrift* 83(12): 564-569. ISSN: 0341-6593.

NAL Call Number: 41.8 D482

Descriptors: spontaneous abortion, antineoplastic agents, cats, contraception, dogs, english abstract, estrus, female, pregnancy, progestational hormones, drug effects on reproduction.

Language of Text: German; Summary in English.

Kato G. (2001). **Proposals for contraception and castration methods in dogs and cats.** *Journal of Veterinary Medicine (Japan)* 54(4): 282-284. ISSN: 0447-0192.

NAL Call Number: SF761 .Z4

Descriptors: castration, contraception, canine, feline, reproduction, animal welfare.

Koger, L.M. (1978). **Calcium chloride castration.** *Modern Veterinary Practice* 59(2): 119-121. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: administration and dosage of calcium chloride, methods of castration, cattle, dogs, evaluation studies, injections, male, testis.

Lacoste, D., R. St-Arnaud, S. Caron, A. Belanger, and F. Labrie (1988). **The rise in testicular androgens during the first days of treatment with an LHRH agonist in the dog can be blocked by aminoglutethimide or ketoconazole.** *Journal of Steroid Biochemistry* 31(6): 963-970. ISSN: 0022-4731.

NAL Call Number: QD426.A1J6

Descriptors: luteinizing hormone releasing hormone, androgens, aminoglutethimide, ketoconazole, receptors, agonists, effects on, serum levels, inhibition, dogs.

Lipatnikov, V.F. (1972). **Khimicheskaya kastratsiya zhivotnykh [Chemical castration of animals].** *Veterinariia* 9: 82-83. ISSN: 0042-4846 .

NAL Call Number: 41.8 V6426

Descriptors: castration, chemicals, dogs, testis, animals.

Language of Text: Russian.

Mahi, C.A. and R. Yanagimachi (1979). **Prevention of in vitro fertilization of canine oocytes by anti-ovary antisera: a potential approach to fertility control in the bitch.** *The Journal of Experimental Zoology* 210(1): 129-135. ISSN: 0022-104X.

NAL Call Number: 410 J825

Abstract: Antisera raised against canine ovaries were found to induce light scattering of the surface of the egg zona pellucida even when diluted 10,000 times, and to delay digestion of the zona by pronase. High concentrations of antiserum were required, however, to inhibit in

in vitro fertilization of the oocytes. Absorption of the antisera with canine ovaries removed these effects, whereas absorption with liver, uterus and serum did not. These results demonstrate the antigenicity of the canine ovary and suggest the plausibility of an anti-zona pellucida vaccine for birth control in the bitch.

Descriptors: contraception, dogs, female, fertilization in vitro, immune sera, oocytes, ovary, pronase, rabbits, sperm-ovum interactions, zona pellucida.

McLaughlin, K.C. and C.E. Hamner (1974). **A demonstration of cat seminal plasma antifertility activity.** *Proceedings of the Society for Experimental Biology and Medicine* 145(1): 103-106. ISSN: 0037-9727.

NAL Call Number: 442.9 So1

Descriptors: buffers, cats, centrifugation, fertilization, heat, pregnancy, rabbits, analysis of semen, species specificity, sperm capacitation, spermatozoa, time factors, trypsin inhibitors.

Misk, N.A. and S.M. Seleim (1991). **Castration in dogs (a comparative study).** *Assiut Veterinary Medical Journal* 26(51): 228-234. ISSN: 1012-5973.

NAL Call Number: SF604.A77

Descriptors: postoperative complications, veterinary surgery, castration techniques, dogs.
Language of Text: English; Summary in Arabic.

Murty, T.S. and G.A. Sastry (1978). **Effect of cadmium chloride (CdCl₂) injection on the histopathology of the testis and the prostate in dogs. I. Intratesticular procedure.** *Indian Veterinary Journal* 55(5): 368-371. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: toxicology, male genitalia, castration, chemosterilants, male infertility, cadmium chloride sterilization, chloride chemosterilant for dog.

Murty, T.S. and G.A. Sastry (1978). **Effect of cadmium chloride (CdCl₂) injection on the histopathology of the testis and the prostate in dogs. II. Subcutaneous procedure.** *Indian Veterinary Journal* 55(10): 815-818. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: males, castration, cadmium chloride, testes, dogs, sterilization.

Mushtaq, M., S. Kulp, W. Chang, and Y.C. Lin (1996). **Gossypol inhibits human chorionic gonadotropin-stimulated testosterone production by cultured canine testicular interstitial cells.** *Research Communications in Molecular Pathology and Pharmacology* 91(3): 259-272. ISSN: 1078-0297.

NAL Call Number: RM1.R4

Abstract: Gossypol (GP) is a natural polyphenolic compound that possesses antifertility and antisteroidogenic activities in both males and females. The dog is highly sensitive to GP toxicity, yet GP's effect on canine testicular steroidogenesis has never been reported. Thus, the present study examines GP's effects on human chorionic gonadotropin (hCG)-induced testosterone (T) production by primary cultured canine testicular interstitial cells. After decapsulation and enzymatic dissociation of canine testes in Dulbecco's Modified Eagle Medium with Ham's Nutrient Mixture F-12 (1:1; DME/F-12) containing 0.1% collagenase,

0.1% BSA, and 10 micrograms/ml DNase 1 (37 degrees C, 20 min), interstitial cells were isolated by sedimentation and filtration (140 microns) and then cultured in supplemented DME/F-12 medium (5 micrograms/ml insulin, 5 micrograms/ml transferrin, 5 ng/ml sodium selenite; DME/F-12/S) containing 0.1% fetal bovine serum (FBS). FBS was used to enhance cell attachment during the first 24 hours of culture. After 24 hours, the medium was replaced with serum-free DME/F-12/S and the cells were cultured for an additional 24 hours. Thereafter, cells were treated with hCG (0.1 IU/ml) alone and in combination with GP (0.05, 0.5, 2.5 and 5.0 microM). Media were collected for T radioimmunoassay and cells for protein estimation after 8, 16 and 24 hours of treatment. Treatment with hCG significantly ($p < 0.05$) stimulated T production over that of controls at all treatment times examined. At 8, 16 and 24 hours, T secretion was elevated from 0.91 +/- 0.25, 1.32 +/- 0.42, and 1.41 +/- 0.40 pg/microgram protein to 2.36 +/- 0.50, 2.84 +/- 0.60, and 2.82 +/- 0.43 pg/microgram protein, respectively. At 0.5, 2.5 and 5.0 microM, GP significantly ($p < 0.05$) reduced hCG-induced T secretion at 16 and 24 hours of treatment to 1.79 +/- 0.50, 1.62 +/- 0.12, 1.34 +/- 0.16 (16 hr), and 1.53 +/- 0.38, 1.43 +/- 0.11, 1.42 +/- 0.32 (24 hr) pg/microgram protein, respectively. At 8 hours, T production was reduced by 2.5 and 5.0 microM GP to 1.08 +/- 0.55 and 0.93 +/- 0.61 pg/microgram protein, respectively. GP, however, did not reduce T production to below basal levels. These results demonstrate the inhibition of hCG-induced T production by GP in cultured canine testicular interstitial cells.

Descriptors: gossypol, antifertility, antisteroidogenic, effects on hCG-induced testosterone production, canine testicular interstitial cells.

Nshimura, N., N. Kawate, T. Sawada, and J. Mori (1992). **Chemical castration by a single intratesticular injection of lactic acid in rats and dogs.** *Journal of Reproduction and Development* 38(4): 263-266. ISSN: 0916-8818.

Descriptors: dogs, rats, castration, lactic acid, injection, testes, testosterone, spermatogenesis, acids, androgens, animal glands, animal husbandry methods, animal morphology, application methods, endocrine glands, gametogenesis, genital system, gonadectomy, hormones, male genital system, mammals, organic acids, physiological functions, reproduction, rodentia, sex hormones, sexual reproduction, sterilization, steroids, surgical operations, urogenital system.

Olson, P.N. and S.D. Johnston (1993). **Animal welfare forum: Overpopulation of unwanted dogs and cats. New developments in small animal population control.** *Journal of the American Veterinary Medical Association* 202(6): 904-909. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: induced abortion, cats, contraceptive trends, dogs, population control.

Patra, S.P. and P.K. Bose (1990). **A new approach for intraovarian injection of cadmium chloride to perform mass sterilization in adult bitches.** *Indian Journal of Animal Health* 29(2): 115-117. ISSN: 0019-5057.

NAL Call Number: SF1.I4

Descriptors: surgical operations, ultrastructure, ovaries, ovariectomy, surgery, dogs, chemosterilization, cadmium chloride.

Pineda, M.H. and M.P. Dooley (1984). **Surgical and chemical vasectomy in the cat.** *American Journal of Veterinary Research* 45(2): 291-300. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: Ejaculates of surgically vasectomized cats had spermatozoa as long as 49 days after vasectomy, indicating that spermatozoa in the ejaculate from intact cats originated from the epididymides and vasa deferentia. Intraepididymal injections of an aqueous solution of 4.5% chlorhexidine digluconate into the caudae of the epididymides induced a lasting oligospermia or azoospermia in 7 of 8 cats. Of these 7 cats, 4 were azoospermic and 1 cat had no intact spermatozoa in his ejaculates 140 days after treatment. The method of chemical vasectomy by intraepididymal injection of sclerosing agents appears to be safe and may be suitable for large-scale sterilization programs for controlling the growth of the feline population.

Descriptors: cats, chlorhexidine, comparative study, dogs, granuloma, oligospermia, population control, spermatozoa, sterilization, testicular diseases, testis, vasectomy.

Pineda, M.H. and D.I. Hepler (1981). **Chemical vasectomy in dogs long-term study.** *Theriogenology* 16(1): 1-12. ISSN: 0093-691X.

Descriptors: nonsurgical sterilization, chlorhexidine, contraceptive, dog, population control, irreversible azoospermia, intraepididymal injection.

Pineda, M.H., T.J. Reimers, L.C. Faulkner, M.L. Hopwood, and G.E. Seidel Jr (1977). **Azoospermia in dogs induced by injection of sclerosing agents into the caudae of the epididymides.** *American Journal of Veterinary Research* 38(6): 831-838. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: Injections of sclerosing agents into the caudae of the epididymides of adult and prepubertal dogs induced a long-lasting and probably irreversible azoospermia. The technique is easy to do and inexpensive, does not seem to cause undesirable side effects, and appears suitable for large-scale sterilization programs in male dogs.

Descriptors: chlorhexidine, dimethyl sulfoxide, dogs, ejaculation, epididymis, formaldehyde, sclerosing solutions, semen, spermatozoa, sterilization.

Pittaway, D.E. (1983). **Inhibition of testosterone synthesis in the canine testis in vitro.** *Contraception* 27(4): 431-436. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: Testicular 17 beta-hydroxysteroid oxidoreductase (17 beta-HOR) is one of the several enzymes necessary for the synthesis of testosterone, but is not required for either glucocorticoid or mineralocorticoid synthesis. Since specific inhibition of the testicular enzyme has potential contraceptive and experimental uses, the inhibitory effect of twenty steroids on 17 beta-HOR activity was examined in microsomal preparations of canine testes. Six steroids inhibited testosterone formation, but only 4-estrene-3,17-dione (KI = 2.4 microM) and 5-androstene-3,17-dione (KI = 6.8 microM) had significant inhibitory activity. The data suggest the following molecular characteristics necessary for competitive inhibition of 17 beta-HOR activity: (a) requirement for 17-keto group, (b) relative requirement for 3-keto group, (c) decreased inhibition with unsaturation in position 5-6, and (d) marked loss of inhibitory activity with 6 beta-, 11 beta- or 19- hydroxylation, and A-ring aromatization.

Descriptors: 17 hydroxysteroid dehydrogenases, dogs, male, contraceptive potential, testosterone, inhibition of testicula enzyme.

Rodaski, S., R.R. Weiss, S.D. Guérios, M.A.M. Torres, G.G. Kasecker, J. Büchele, and A.B. Nardi (2001). **Chemical sterilization in dogs with intraepididymal 0.1% adrenaline and 10% lugol's solution.** *Archives of Veterinary Science* 6(2): 9-17. ISSN: 1517-784X.

Descriptors: chemosterilants, epididymis, epinephrine, male fertility, spermatozoa, sterilization, toxicity, toxicology, dogs.

Samanta, P.K. (1998). **Chemosterilization of stray dogs.** *Indian Journal of Animal Health* 37(1): 61-62. ISSN: 0019-5057.

NAL Call Number: SF1.I4

Descriptors: sterilization, calcium chloride, testes, histology, morphology, seminiferous tubules, interstitial cells, parenchyma, dogs.

Senn, R. (1981). **Kastrierplattchen mit Spannbügel [Castration device with tension plate for cats].** *Kleintier-Praxis* 26(5): 307. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: apparatus, techniques, surgical instruments, castration, cats.

Language of Text: German; Summary in English, French, and Italian.

Stovring, M., L. Moe, and E. Glatte (1997). **A population-based case-control study of canine mammary tumours and clinical use of medroxyprogesterone acetate.** *Acta Pathologica, Microbiologica Et Immunologica Scandinavica* 105(8): 590-596. ISSN: 0903-4641.

NAL Call Number: QR1.A6

Abstract: We investigated whether or not an association could be found between mammary tumours and prior clinical use of medroxyprogesterone acetate (MPA) in bitches. A population-based retrospective age-matched case-control study was designed based on interviews with the owners of the bitches. The proportion of bitches with diagnosed mammary tumours (group MT+, n = 98) that had received progestin injections was compared with the proportion in a control group without mammary tumours (group MT-, n = 98). In the case group 39%, and in the control group 21% of the bitches had been treated with MPA. A significantly higher number of bitches with mammary tumours had been exposed to progestins, compared with the control group without mammary tumours (odds ratio = 2.32, Chi-square = 7.01, p = 0.008). Bitches treated clinically with low doses of MPA to avoid oestrus were at a greater risk of developing mammary tumours, the majority of which were histologically malignant (91%).

Descriptors: medroxyprogesterone acetate, mammary tumor development, female contraceptive agents, dogs.

Thompson, D.L. (2000). **Immunization against GnRH in male species (comparative aspects).** *Animal Reproduction Science* 60/61: 459-469. ISSN: 0378-4320.

NAL Call Number: QP251.A5

Descriptors: GnRH, immunization, livestock, animal behavior, fertility, neutralization, odours, testes, male animals, reproduction, aggressive behavior, immunocastration.

Volpe, P., B. Izzo, M. Russo, and L. Iannetti (2001). **Intrauterine device for contraception in dogs.**

The Veterinary Record 149(3): 77-79. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: A new intrauterine device for contraception was tested on nine bitches. After it had been implanted, the bitches were mated but none of them became pregnant. Over a two-year period no side effects were observed, except in a bulldog bitch in which signs of oestrus persisted until the device had been removed.

Descriptors: contraception, intrauterine devices, dogs.

Von Berky, A.G. and W.L. Townsend (1993). **The relationship between the prevalence of uterine lesions and the use of medroxyprogesterone acetate for canine population control.** *Australian Veterinary Journal* 70(7): 249-250. ISSN: 0005-0423.

NAL Call Number: 41.8 Au72

Abstract: The prevalence of uterine disease was established during desexing of 175 bitches in the Torres Strait and Cape York, 42 of which had been treated with injectable medroxyprogesterone acetate (MPA) for oestrus postponement. The prevalence of uterine lesions was 45% for treated bitches, 5% for untreated bitches, and 14.9% for the sample population. A highly significant relationship ($P < 0.01$) between MPA treatment and uterine lesions was established. A significant association ($P < 0.05$) between age (> 2 years old) and uterine lesions was found, most likely attributable to a significantly higher proportion ($P < 0.01$) of MPA-treated bitches in the older population. There was no significant difference in the effect of MPA on the prevalence of uterine lesions between older and younger bitches. There was no effect of parity on the prevalence of uterine lesions.

Descriptors: estrus postponement, medroxyprogesterone acetate, uterine lesions, adverse effects, ovariectomy, dogs.

Wang, W.C., R.F. Lu, S.X. Zhao, and Y.Z. Zhu (1982). **[Antifertility effect of pseudolaric acid B].**

Acta Pharmacologica Sinica 3(3): 188-192. ISSN: 0253-9756.

Descriptors: plant extracts, pregnancy, animal drug effects, castration, dogs, chemically induced fetal death, mice, progesterone, rabbits, rats.

Language of Text: Chinese.

Weissinger, J. and D. McRae (1991). **FDA fast-tracking of pet population control drugs.** *Journal of the American Veterinary Medical Association* 198(7): 1231-1233. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Theriogenologists have been studying estrus prevention and termination of pregnancy in dogs for at least 2 decades. However, drugs approved for estrus suppression are few. No dog or cat abortifacients or male dog and cat sterilants have been approved. Marketed drugs with alternate indications that have antiestrus and antihormonal activity might be good candidates for study after obtaining an INAD from FDA. With the support of the original drug sponsor or manufacturer and appropriate safety and effectiveness studies, these products may be studied for additional label claims. New (not previously approved) drugs additionally need detailed information regarding the synthesis and manufacturing controls. Drugs offering substantial benefit over existing therapeutics may be eligible for expedited review. Prior to starting any studies in this area, clinical investigators and sponsors should

communicate with FDA, an INAD must be granted, and the protocol submitted for evaluation. Approvability is evaluated after establishment of safety and effectiveness in clinical field trials.

Descriptors: abortifacient agents, cats, dogs, drug and narcotic control, estrus, female, population control, United States Food and Drug Administration.

Wildt, D.E. and S.W. Seager (1977). **Reproduction control in dogs.** *The Veterinary Clinics of North America* 7(4): 775-787. ISSN: 0091-0279.

NAL Call Number: SF601.V523

Descriptors: castration, contraception, contraceptive devices, dogs, estrus, hysterectomy, immunization, megestrol, nandrolone, ovulation, tubal sterilization, vasectomy.

Wright, P.J., T. Stelmasiak, D. Black, and D. Sykes (1979). **Medroxyprogesterone acetate and reproductive processes in male dogs.** *Australian Veterinary Journal* 55(9): 437-438. ISSN: 0005-0423.

NAL Call Number: 41.8 Au72

Abstract: The treatment of normal male dogs with a depot preparation of medroxyprogesterone acetate (4 mg/kg) for 7 weeks reduced peripheral testosterone levels by 58%. No effects on testicular size and consistency, semen quality or libido were found.

Descriptors: libido, semen quality, testosterone levels, testis, medroxyprogesterone acetate, dogs, male, drug effects on reproduction.

Hormonal Methods of Contraception

Baldwin, C.J., A.T. Peter, and W.T. Bosu (1996). **Adrenocortical function in the domestic cat during treatment with levonorgestrel.** *Research in Veterinary Science* 60(3): 205-208. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: Levonorgestrel was administered via a subcutaneous, slow-release silastic implant to 10 queens. Five other queens served as controls. Their adrenocortical function was assessed by the adrenocorticotrophic hormone (ACTH) stimulation test before and after one, two, six and 12 months of treatment. In addition, the gross anatomy and histology of the adrenal gland were examined post mortem in six of the treated cats. In both the control and treated queens the plasma cortisol concentrations (pre and post ACTH) were significantly different ($P < 0.05$) at different times. However, there were no significant differences between the plasma cortisol concentrations (pre and post ACTH) of the treated and control queens. No gross or microscopical abnormalities were visible in the adrenal glands of the treated queens.

Descriptors: adrenal cortex, cats, oral contraceptives, corticotropin, drug implants, female, hydrocortisone, levonorgestrel, reference values, silicone elastomers.

Baldwin, C.J., A.T. Peter, W.T. Bosu, and R.R. Dubielzig (1994). **The contraceptive effects of levonorgestrel in the domestic cat.** *Laboratory Animal Science* 44(3): 261-269. ISSN: 0023-6764.

NAL Call Number: 410.9 P94

Abstract: The effects of subdermal implantation of levonorgestrel (LNG) on reproduction were studied in domestic cats (*Felis domestica*). Levonorgestrel was administered via a slow-release subdermal silastic implant to 10 queens. The implants contained 16 mg of LNG and were designed to release 60 micrograms of the drug daily. Each treated queen received one implant. Five queens (control, group 1) received subdermal silastic implants containing no drug. Changes in body weight, mammary gland structure (determined by palpation), serum blood glucose concentrations, and reproductive factors (occurrence of estrous cycles, serum progesterone concentrations, and pregnancy) were monitored for 1 year. Four treated queens (treatment/recovery, group 2) were used to investigate reproductive function following 12 months of LNG treatment. To assess effects of treatment on macroscopic and microscopic anatomic features of reproductive and nonreproductive tissues, the remaining six cats (treatment/histology, group 3) were studied. Hemiovariohysterectomy was performed in two queens each at 0, 2, and 6 months of the study. Later, the remainder of the reproductive tract was harvested at necropsy (two after 2 months of treatment, two after 6 months, two after 12 months) to assess change in individual queens. Nonreproductive tissues were also examined at necropsy to determine effects of LNG in these six queens. All queens retained the implants during the period of study without detectable discomfort. Estrus was suppressed and no pregnancies were recorded in the four LNG-treated cats that were housed with a male. Treatment with LNG had no effect on body weight, physical mammary gland structure, or serum blood glucose concentrations.

Descriptors: animals, blood glucose, cats, contraceptive agents, drug implants, estrus, female, levonorgestrel, anatomy and histology of the ovary, pregnancy, progesterone.

Beier, S., F. Haase, B. Kosub, B. Dusterberg, and W. Elger (1979). **The progestational activity of different gestagens used for human contraception in the beagle bitch.** *Contraception* 20(6): 533-548. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Descriptors: animals, chlormadinone acetate, contraception, cyproterone, dogs, dose-response relationship, endometrium, female, human, nandrolone, norethindrone, norgestrel, progestins.

Bell, E.T. and D.W. Christie (1971). **The use of progestagens in the control of the canine oestrous cycle.** *The Journal of Small Animal Practice* 12(7): 375-382. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: oral contraceptives, dog diseases, chemically induced endometritis, estrus, female, medroxyprogesterone, megestrol, norethindrone, adverse effects of progestins, uterine diseases.

Briggs, M. (1977). **The beagle dog and contraceptive steroids.** *Life Sciences* 21(3): 275-284. ISSN: 0024-3205.

NAL Call Number: 442.8 L62

Descriptors: oral contraceptives, dogs, drug evaluation, mammary glands, progesterone, neoplasms.

Bryan, H.S. (1973). **Parenteral use of medroxyprogesterone acetate as an antifertility agent in the bitch.** *American Journal of Veterinary Research* 34(5): 659-663. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: breeding, dogs, drug effects on estrus, analysis of feces, female, fertility, injections, medroxyprogesterone, pregnancy.

Burns, R., G. Mcrae, and L. Sanders (1990). **A one year controlled release implant or the LHRH superagonist rs-49947 ii. Clinical performance results.** *Journal of Controlled Release* 14(3): 233-242. ISSN: 0168-3659.

Descriptors: dog, reversible chemical castration, drug release profile and duration, plasma level, estrus, drug delivery.

Colon, J., M. Kimball, B. Hansen, and P.W. Concannon (1993). **Effects of contraceptive doses of the progestagen megestrol acetate on luteinizing hormone and follicle-stimulating hormone secretion in female dogs.** *Journal of Reproduction and Fertility Supplement* 47: 519-521. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Descriptors: anestrus, comparative study, dogs, female, follicle stimulating hormone, luteinizing hormone, megestrol acetate, ovariectomy.

- Concannon, P.W., M. Temple, A. Montanez, and D. Frank (1993). **Synchronous delayed oestrus in beagle bitches given infusions of gonadotrophin-releasing hormone superagonist following withdrawal of progesterone implants.** *Journal of Reproduction and Fertility Supplement* 47: 522-523. ISSN: 0449-3087.
NAL Call Number: 442.8 J8222 Suppl.
Descriptors: delayed estrus, contraceptive agents, drug implants, estrus synchronization, dogs, gonadorelin, progesterone.
- Corrada, Y., D. Arias, R. Rodriguez, E. Spaini, F. Fava, and C. Gobello (2004). **Effect of tamoxifen citrate on reproductive parameters of male dogs.** *Theriogenology* 61(7-8): 1327-1341. ISSN: 0093-691X.
NAL Call Number: QP251.A1T5
Descriptors: tamoxifen, dog, sperm, prostate, testis, therapy.
- Cukierski, M.J., P.A. Johnson, and J.C. Beck (2001). **Chronic (60-week) toxicity study of DUROS leuprolide implants in dogs.** *International Journal of Toxicology* 20(6): 369-381. ISSN: 1091-5818.
NAL Call Number: RA1190.J61
Descriptors: implants, leuprolide, dogs, chronic toxicity.
- Drieu, K. and I. Osterburg (1989). **Influence of decapeptyl on reproductive functions.** *Contraception Fertilite Sexualite* 17(12): 1105-1108. ISSN: 1165-1083.
Descriptors: LHRH, fertility, castration, rat, dogs, preimplantation, embryogenesis.
- Drill, V.A., K.S. Rao, R.G. McConnell, and E.N. Souri (1975). **Ocular effects of oral contraceptives. I. Studies in the dog.** *Fertility and Sterility* 26(9): 908-13. ISSN: 0015-0282.
Abstract: The administration of two oral contraceptives to female dogs for 5 years did not produce ocular lesions. Corneal and lenticular opacities occurred with equal frequency in control and treated groups, and fundic lesions, including papilledema, venous dilatation, and venous or arterial retinal thrombosis, were not produced by doses of Enovid-E or Ovulen 1, 10, and 25 times the human dose.
Descriptors: adverse effects of oral contraceptives, eye diseases, body weight, ocular lesions, lens, mestranol, norethynodrel.
- Dube, D., A. Assaf, G. Pelletier, and F. Labrie (1987). **Morphological study of the effects of an GnRH agonist on the canine testis after 4 months of treatment and recovery.** *Acta Endocrinologica* 116(3): 413-417. ISSN: 0001-5598.
Abstract: After 4 months of treatment of adult male dogs with the GnRH agonist (GnRH-A) [D-Trp6]GnRH ethylamide, the seminiferous tubules contained only type A and B spermatogonia, Sertoli cells, and rare primary spermatocytes, thus causing a 64% decrease in testis weight. At the electron microscope level, Sertoli cells showed an increase in phagosomes and lipid droplets. Leydig cells were markedly atrophied with the accumulation of lipid droplets and showed a predominance of mitochondria with lamellar instead of vesicular cristae. Four months after cessation of treatment with GnRH-A, a complete return to normal

spermatogenesis and Leydig cell morphology was observed. The full reversibility of spermatogenesis in the dog after chronic GnRH-A treatment suggests that this well-tolerated peptide could be used as a reversible method of male contraception.

Descriptors: GnRH agonist, testis weight decrease, spermatogenesis, reversible male contraception, dogs.

Dusterberg, B. and S. Beier (1984). **Plasma levels and progestational activity of levonorgestrel after repeated intravenous and subcutaneous administration in the beagle bitch.** *Contraception* 29(4): 345-357. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: In pharmacological test models providing repeated daily administrations of steroid hormones, differing time courses of the drug level depending upon the pharmacokinetics can be observed often. The present study should make a contribution to the question whether the time course of the drug level can have an influence on the effectiveness of a given dose of a synthetic gestagen. On the basis of existing pharmacokinetic and pharmacodynamic data in the beagle dog, levonorgestrel (LN) was selected as progestogen. LN was administered daily in equal dosages (0.1 mg) over a period of 14 days subcutaneously (s.c.) and intravenously (i.v.). The gestagenic potency of LN was assessed in an established bioassay by the histological evaluation of the endometrial transformation. Whereas the s.c. administration resulted in a low, but almost constant, LN level, high peaks of short duration could be determined after i.v. administration. Following s.c. injection, LN was released only to a degree of 60% in the observation period compared with 100% after i.v. administration. Nevertheless, 0.1 mg LN given s.c. had stronger endometrial effects than 0.1 mg LN given as bolus i.v.

Descriptors: oral contraceptives, estrus, injections, dogs, levonorgestrel, endometrial effects, progestogen.

England, G.C. (1997). **Effect of progestogens and androgens upon spermatogenesis and steroidogenesis in dogs.** *Journal of Reproduction and Fertility Supplement* 51: 123-138. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: Two different progestogens, mixed testosterone esters, and a combination of progestogen and androgens were evaluated for their effect on semen quality and peripheral plasma testosterone and LH concentration in dogs. Megestrol acetate (2 mg kg⁻¹) given orally for 7 days, and medroxyprogesterone acetate (10 mg kg⁻¹) given subcutaneously produced no change in semen quality compared with that of control dogs. Higher doses of megestrol acetate (4 mg kg⁻¹) produced minor secondary sperm abnormalities, whereas 20 mg medroxyprogesterone acetate kg⁻¹ produced a rapid and significant decrease in sperm motility, morphology and output. The effect of progestogen was probably mediated by action upon the epididymis, since semen quality declined rapidly, morphological changes were the result of more secondary sperm abnormalities, and there was no suppression of plasma LH concentration. Mixed testosterone esters (5 mg kg⁻¹) produced a significant decline in semen quality, which occurred 3 weeks after treatment and persisted for 3 months. There was an increase in the number of primary sperm abnormalities, and it was thought that the effect was probably related to suppression of gonadotrophin resulting in an effect on spermatogen-

esis. The combination of mixed testosterone esters (5 mg kg⁻¹) and medroxyprogesterone acetate (20 mg kg⁻¹) produced a rapid and profound decrease in semen quality. It was postulated that the effect of this combination of treatment on semen quality was mediated directly by the progestogen upon the epididymal phase of development, and the androgen causing suppression of gonadotrophins. Indeed a reduction in the plasma LH concentration was noted, and both primary and secondary sperm abnormalities were present. The dog appears to differ from other species in the sensitivity of the pituitary-hypothalamus to progestogen feedback. Gonadotrophin suppression does not occur even when high doses of progestogens are used and there are no significant effects on libido. However, combinations of progestogens and androgens may provide a clinically useful method of reversible contraception in the dog.

Descriptors: reversible contraception, progestogens, androgens, semen quality, plasma testosterone, luteinizing hormone concentration, dogs.

Evans, J.M., O. Uvarov, and D.K. Valliance (1969). **Hormonal control of the oestrus cycle in the bitch.** *The Veterinary Record* 85(8): 233-234. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: oral contraceptives, dogs, drug effects on estrus, female, megestrol, pregnancy, pregnanes, progestins.

Findlay, M.A. (1975). **Letter: Oral progestagens in cats.** *The Veterinary Record* 96(18): 413. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: megestrol, cats, oral administration, female.

Geil, R.G. and J.K. Lamar (1977). **FDA studies of estrogen, progestogens, and estrogen/progestogen combinations in the dog and monkey.** *Journal Of Toxicology And Environmental Health* 3(1-2): 179-193. ISSN: 0098-4108.

NAL Call Number: RA565.A1J6

Abstract: A study begun by a drug company and taken over by the FDA (Food and Drug Administration) in 1970 attempted to assess the role of oral contraceptives in tumorigenesis and clotting abnormalities in animals. The study used ethynerone (MK 665) + mestranol; chloroethynyl norgestrel (Wy-4355) + mestranol; anagestone acetate + mestranol; ethynerone, and; mestranol administered at levels up to 25 times the human use level to female beagle dogs and 50 times the human use level to female rhesus monkeys. No behavioral changes related to compound or dose were observed in either species. Both species exhibited pharmacologic effects of hormone administration. Inhibition of the estrous cycle and vulvar enlargement were seen in all dosed dogs. Both species exhibited a dose-dependent, nonprogressive decrease in hemoglobin and hematocrits, with the anagestone acetate-mestranol combination showing the greatest effect. More nodules developed in the mammary glands of dogs who received the progestogen-mestranol combinations and who received ethynerone alone than control dogs. The 3 progestogen-mestranol combination showed the greatest tumorigenic effect as expressed by the number of dogs affected and by numbers of mammary nodules. This effect was dose-dependent for the ethynerone-mestranol and chloroethynyl norgestrel-mestranol combinations, but for the anagestone acetate-mestranol combination

was maximal at the lower dose. A small number of dogs that received each progestogen-mestranol combination developed clinically malignant tumors; control dogs or dogs that received only mestranol or ethynerone were unaffected. In contrast, none of the drugs was associated with an increased incidence of mammary nodules in the monkeys. Some monkeys that received each drug showed ductal epithelial hyperplasia in mammary gland biopsies. Diabetes mellitus occurred in 10 dogs from the chloroethynyl norgestrel-mestranol and anagestone acetate-mestranol groups and in 3 monkeys from the ethynerone-mestranol high dose and anagestone acetate-mestranol high dose groups. Generalized cystic hyperplasia of the gallbladder mucosa was seen in a small number of dogs from the anagestone acetate-mestranol group. The suitability of the dog as test species for the tumorigenic and carcinogenic study of oral contraceptives is indicated.

Descriptors: alopecia, laboratory animals, clinical research, contraception, contraceptive methods, estrogen, progestin, mestranol, oral contraceptives.

Goldzieher, J.W., C.B. Chenault, A. de la Pena, T.S. Dozier, and D.C. Kraemer (1977). **Comparative studies of the ethynyl estrogens used in oral contraceptives: effects with and without progestational agents on plasma cortisol and cortisol binding in humans, baboons, and beagles.** *Fertility and Sterility* 28(11): 1182-1190. ISSN: 0015-0282.

NAL Call Number: 448.8 F41

Descriptors: comparative study, dogs, ethynyl estradiol, animal models, hydrocortisone, megestrol, mestranol, norethindrone, norgestrel, oral contraceptives.

Hassan, T., R.E. Falvo, V. Chandrashekar, B.D. Schanbacher, and C. Awoniyi (1985). **Active immunization against LHRH in the male mongrel dog.** *Biology of Reproduction* 32(Suppl. 1): 222. ISSN: 0006-3363.

NAL Call Number: QL876.B5

Descriptors: LHRH, immunocontraception, dogs.

Horoz, H., C.S. Konuk, K. Gurbulak, G. Kasikci, M.E.C. Sonmez, and A. Gurel (2000). **The effect of intrauterine device (IUD) administration on fertility, serum progesterone, oestradiol 17 beta and uterine endometrium during the induced estrus cycle in the bitch.** *Veteriner Fakultesi Dergisi Istanbul* 26(2): 325-335. ISSN: 0378-2352.

Descriptors: bitches, clinical aspects, endometritis, endometrium, estradiol, female infertility, intrauterine devices, oestrous cycle, oestrus, progesterone, pyometra, dogs.

Language of Text: Turkish.

Hubler, M. and S. Arnold (2000). **Verhinderung der Trächtigkeit bei Hündinnen mit dem Progesteronantagonisten Aglépristone (Alizine) [Prevention of pregnancy in bitches with the progesterone antagonist anglepristone (Alizone)].** *Schweizer Archiv Fur Tierheilkunde* 142(7): 381-386. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Abstract: A study was carried out between April 1997 and October 1998 to determine the effect of the progesterone antagonist, Aglépristone (Alizine), for the prevention of pregnancy. 93 bitches were treated, because of mismating, with Aglépristone. The owners were then contacted 2 weeks and 6 to 12 months after treatment to gather any information on

effects noted over this period. The major questions were, was pregnancy prevented and if so what side effects were observed, if any, and whether any metropathies were diagnosed. Also noted was the beginning of the next heat and, if the bitch was mated, the fertility rate. Pregnancy was seen in only one bitch. In 51 bitches minor side effects, either singularly or in combination, such as a transient itch, vaginal discharge, reduced appetite, tiredness or attachment were observed. The fertility was not influenced by the treatment and the incidence of metropathies was unchanged.

Descriptors: contraception, contraceptive agents, dogs, estrogens, female, hormone antagonists, pregnancy, progesterone.

Language of Text: German.

Inaba, T., T. Umehara, J. Mori, R. Torii, H. Tamada, and T. Sawada (1996). **Reversible suppression of pituitary-testicular function by a sustained-release formulation of a GnRH agonist (leuprolide acetate) in dogs.** *Theriogenology* 46(4): 671-677. ISSN: 0093-691X.

NAL Call Number: QP251.A1T5

Descriptors: GnRH, LH, testosterone, semen, dog, testis function, contraception, leuporelin, gonadorelin agonist.

Jochle, W. and M. Jochle (1975). **Reproductive and behavioral control in the male and female cat with progestins: long-term field observations in individual animals.** *Theriogenology* 3(5): 179-185. ISSN: 0093-691X.

NAL Call Number: QP251.A1T5

Descriptors: cats, chlormadinone acetate, comparative study, estrus, female, megestrol, pregnancy, progestins, sexual behavior, social dominance.

Johnson, A.N. (1989). **Comparative aspects of contraceptive steroids--effects observed in beagle dogs.** *Toxicologic Pathology* 17(2): 389-95. ISSN: 0192-6233.

Abstract: The effects of oral contraceptives have been studied in the beagle bitch for periods up to 7 yr. High doses of these potent estrogen: progestogen (E:P) combinations have been shown to promote tumors in the mammary glands, smooth muscle of the tubular genitalia, and occasionally in the transitional epithelium of the neck/trigone area of the urinary bladder. The contraceptive formulations used in humans are balanced with an E:P ratio of about 1:5 to 1:80 to produce a desired decidual response in the uterus. The corresponding ratio for producing the decidual reaction in the dog is 1:1,000 to 1:3,000 with the result that the dog is grossly overdosed with estrogens when given the human formulation at the usual multiples of up to 25 times the human dose. Smooth muscle tumors of the tubular reproductive tract are common sequelae to estrogen overstimulation in the dog and are known to occur in other species, including the humans. The dog also has major differences in hormonal control and sensitivity when compared to humans. Progestogens stimulate synthesis and release of growth hormone (GH) in dogs which in turn is the major stimulant (with progestogens) of mammary growth and tumors. Evidence is accumulating which indicates that most if not all progestogens can produce mammary tumors in the dog if given by the correct route and at high enough dosage. In contrast, GH in humans is not increased nor does it have any significant mammatrophic role. Mammary tumors in dogs related to oral contraceptives are now widely considered to be irrelevant as a model or predictor for human

tumors. Transitional cell tumors in the urinary bladder seem to be a species specific phenomenon seen on occasion in the dog, but not in the rat, monkey, or human. The usual location in the neck/trigone area may be related to the embryologic origin of this portion of the bladder, which derives from tissues more closely related to the genital organs than does the rest of the bladder.

Descriptors: contraceptives, oral, hormonal toxicity, dogs, neoplasms chemically induced.

Kwapien, R.P., R.C. Giles, R.G. Geil, and H.W. Casey (1977). **Basaloid adenomas of the mammary gland in beagle dogs administered investigational contraceptive steroids.** *Journal of the National Cancer Institute* 59(3): 933-940. ISSN: 0027-8874.

NAL Call Number: 176.622 J82

Descriptors: adenomas, oral contraceptives, mammary tumors, light microscopy, progestins, estrogens, mestranol, dogs.

Kwapien, R.P., R.C. Giles, R.G. Geil, and H.W. Casey (1980). **Malignant mammary tumors in beagle dogs dosed with investigational oral contraceptive steroids.** *Journal of the National Cancer Institute* 65(1): 137-144. ISSN: 0027-8874.

NAL Call Number: 176.622 J82

Abstract: Of 172 beagle dogs administered investigational oral contraceptive steroids for 2.4-5.2 yr, 9 developed malignant mammary tumors. At necropsy their ages varied from 41-70 mo., with a mean age of 4.9 yr. The malignant tumors were observed in 1 dog that received ethynerone plus mestranol at 1.05 mg/kg per day and in 4 dogs that received chlorethynyl norgestrel plus menstranol at 1.05 mg/kg per day. Also, 4 dogs that received anagestone acetate plus menstranol at 0.44 or 1.10 mg/kg per day developed malignant mammary tumors. Malignant tumors were not seen in 33 dogs administered mestranol at 0.02 and 0.05 mg/kg per day for 7 yr or in 18 dogs given ethynerone without mestranol at 1.00 mg/kg per day for 5 yr. No malignant tumors were observed in 18 control dogs maintained for 7 yr without treatment. Three dogs had single malignant mammary nodules, 3 dogs had 2 malignant nodules, 2 dogs had 4-6 malignant nodules and 1 dog in the treatment group given high dosages of ethynerone plus mestranol had 14 mammary nodules composed of fibrosarcoma. The malignant tumors were histologically classified as 5 anaplastic carcinomas, 2 solid carcinomas, 1 tubular adenocarcinoma, 1 squamous cell carcinoma and 1 fibrosarcoma. Most dogs had only 1 histologic type of cancer (8/9 dogs); 1 dog had carcinomas of both solid and anaplastic types involving different glands. Metastases were present in 5 dogs and most often involved regional lymph nodes and lung.

Descriptors: adenocarcinoma, carcinogens, oral contraceptives, dogs, fibrosarcoma, lung neoplasms, mammary tumors, mestranol, norgestrel, norpregnadienes, pregnenes.

McDonald, M. (1980). **Contraceptives for feral cats.** *The Veterinary Record* 106(18-20): 418. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: animal population groups, feral cats, oral contraceptives, population control, poisoning.

McRae, G.I., B.B. Roberts, A.C. Worden, A. Bajka, and B.H. Vickery (1985). **Long-term reversible suppression of oestrus in bitches with nafarelin acetate, a potent LHRH agonist.** *Journal of Reproduction and Fertility* 74(2): 389-397. ISSN: 0022-4251.

NAL Call Number: 442.8 J8222

Abstract: Adult cyclic beagle bitches were treated for up to 18 months with nafarelin acetate via subcutaneously implanted osmotic pumps, starting during the first week of a pro-oestrous vaginal discharge. The imminent ovulation appeared to be unaffected by treatment, but doses of 8 or 32 micrograms analogue/day reduced the integrated luteal progesterone values. No new oestrus was detected in 3 bitches during 18 months of treatment with 32 micrograms/day, which resulted in mean plasma levels of 0.4 ng analogue/ml. A return to oestrus was observed in all 3 bitches between 3 and 18 weeks after cessation of treatment: 2 of the bitches mated at those times and produced normal litters. Another 2 bitches were similarly treated with 32 micrograms analogue/day; they were mated at the oestrus at start of treatment and dosing was continued for about 63 days. One of the bitches conceived and produced a normal litter. Nafarelin acetate treatment begun during anoestrus resulted in an induced heat 1-2 weeks after the start of treatment. The induced heat consisted of pro-oestrous vaginal discharge, oestrous vaginal cytology, and ovulation (judged by increased circulating levels of progesterone). Three bitches mated at the induced heat and treated for the normal duration of gestation did not litter. Nafarelin treatment of 3 bitches before puberty did not induce signs of oestrus and prevented the occurrence of oestrus through 18 months of treatment. The first oestrus in these bitches occurred 3.5-4 months after cessation of treatment, but mating at that time did not result in pregnancy. These studies have established the feasibility of and dosage requirement for the use of the LHRH agonist as a contraceptive in the bitch.

Descriptors: contraception, oestrus suppression, LHRH agonist, dogs.

Munson, L., J.E. Bauman, C.S. Asa, W. Jochle, and T.E. Trigg (2001). **Efficacy of the GnRH analogue deslorelin for suppression of oestrous cycles in cats.** *Journal of Reproduction and Fertility* 57(Suppl.): 269-273. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: The aim of this study was to develop a method for long-term but reversible inhibition of oestrous cycles in female cats by downregulation of GnRH receptors with deslorelin released from a long-acting implant. In a blind study with mature cats (n = 20), a 6 mg deslorelin implant was administered s.c. to ten cats and a placebo implant was administered to ten cats. Occurrence of oestrus and general health were observed daily, and individual faecal samples were collected at 3 day intervals for 14 months and analysed for oestradiol content. All the placebo-treated queens continued to undergo normal oestrous cycles during the study. Oestrus was accompanied by peaks in oestradiol concentrations of > or = 20 ng g⁻¹ faeces. Treatment with deslorelin initially stimulated oestradiol release, which accompanied treatment-induced ovulations. Thereafter, oestradiol concentrations decreased to 1-10 ng g⁻¹ faeces and remained low for extended periods. Observations of small increases in oestradiol concentrations in one cat led to a second treatment with 6 mg deslorelin in five cats on day 155 after first treatment. Faecal oestradiol concentrations remained < 20 ng g⁻¹ faeces in the five single treatment cats for 8.0, 8.5, 11.0 and 14.0 (two cats) months. Cats receiving two implants had the first oestradiol peak > 20 ng g⁻¹ faeces after treatment at 7.5, 11.0 (two cats), 11.5 and 14.0 months. After 14 months, two cats had returned to normal cyclic activ-

ity, two had irregular small oestrogen peaks and six showed no cyclic activity. For months 2-5, 6-10 and 11-14, oestrogen values in treated cats were significantly different from control values ($P < 0.001$, 0.05 and 0.02, respectively). Differences in oestrogen concentration between control cats and cats that were treated twice were significant ($P < 0.001$) during months 6-10 only. The general health of treated cats was unchanged throughout the study. These results confirm that deslorelin can effectively suppress ovarian activity in domestic cats, but that the duration of suppression varies among individuals.

Descriptors: female cats, contraceptive agents, estradiol, gonadorelin, estrus detection, inhibition of estrus, drug implants, deslorelin.

Murakoshi, M., R. Ikeda, M. Tagawa, T. Iwasaka, and T. Nakayama (2000). **Histopathological study of female beagle dogs for four year treatment with subcutaneous implantation of chlormadinone acetate (CMA).** *The Tokai Journal of Experimental and Clinical Medicine* 25(3): 87-91. ISSN: 0385-0005.

Abstract: The histopathological changes related to chlormadinone acetate (CMA) implantation were examined using female beagle dogs given 10mg/kg for four years. All control animals showed sign of estrus during the experiment, with periods of anestrus of normal duration. In contrast, estrus was completely inhibited in the CMA-implanted animals. Histopathologically, uterine sections from the CMA-implanted animals showed cystic glandular hyperplasia, but no histologic evidence of endometritis, myometritis, and pyometra was found. In the ovaries of the CMA-implanted animals, developing ovarian follicles were observed but no mature follicles were noted in addition to an absence of corpus luteum. No remarkable changes were observed in the liver, adrenal, mammary gland, gallbladder and implanted site. Furthermore, the intensity of staining and number and size of ACTH- and LH-positive cells in the pituitary sections of CMA-implanted animals were not different from control animals. It was concluded, therefore, that subcutaneous implantation of CMA is a potential drug-delivery system for reducing changes due to antigonadotropic and glucocorticoid-like activities and characteristic histopathological changes in the uterus due to progestagenic activity.

Descriptors: chlormadinone acetate implants, contraceptive agents, dogs, physiological effects, drug implants.

Nelson, L.W., J.A. Botta Jr, and J.H. Weikel Jr (1973). **Estrogenic activity of norethindrone in the immature female beagle.** *Research Communications in Chemical Pathology and Pharmacology* 5(3): 879-882. ISSN: 0034-5164.

NAL Call Number: RM1.R4

Descriptors: cervix uteri, dogs, estradiol, female, mammary glands, norethindrone, ovary, progesterone, uterus, vagina.

Nelson, L.W., J.H. Weikel Jr., and F.E. Reno (1973). **Mammary nodules in dogs during four years' treatment with megestrol acetate or chlormadinone acetate.** *Journal of the National Cancer Institute* 51(4): 1303-1311. ISSN: 0027-8874.

Abstract: A 7 year study of megestrol and chlormadinone in female dogs is in progress. This report characterized histopathologically 60 mammary nodules during the first 4 years of the study. 100 purebred female beagles, 6-12 months of age, were randomly assigned to 5 equal

groups. One group was used as a control. Oral doses were .01, .10, and .25 mg/kg/day of megestrol acetate in coconut oil in capsules and of chlormadinone acetate .25 mg/kg/day in lactose tablets. These doses were 1, 10, and 25 times the projected dose of megestrol for humans and about 25 times the human dose of chlormadinone. After 2 years 4 dogs from each group were necropsied. One high-dose megestrol-treated and 1 chlormadinone-treated dog had benign mixed mammary tumors. Palpable nodules were first observed at 16 months in the chlormadinone-treated dogs, at 18 months in dogs given the high dose megestrol and at 27 months in the dogs treated with middle-dose megestrol. Transitory nodules were found in 4 control dogs after 21 months and in low dose megestrol-treated dogs at 26 months. Of 38 grossly detected nodules evaluated microscopically from the megestrol-treated dogs 27 were nodular hyperplasia, 5 were benign mixed mammary tumors, 3 were ductal dilatations, 1 was a lymph node, 1 was fat necrosis and 1 was the umbilicus. Of 22 nodules from the chlormadinone-treated dogs 12 were nodular hyperplasia, 4 benign mixed mammary tumors, 1 chondromuroid degeneration and 1 adenocarcinoma with widespread metastases. 3 nodules were lymph nodes and 1 other had no mammary tissue. Involution, regression and sclerosis of many areas of nodular hyperplasia were evident at 4 years. Thus of the 60 nodules evaluated during the first 4 years of the study 50 were non-neoplastic and 10 were neoplastic. It is considered that the 1 adenocarcinoma may have been spontaneous and not a treatment-related neoplasm. A precursor stage through nodular hyperplasia apparently did not occur.

Descriptors: adenocarcinoma, chlormadinone, contraceptives, mammary glands, drug effects, megestrol, adenocarcinoma, chlormadinone acetate, dogs, hyperplasia.

Okkens, A.C., J.E. Eigenmann, and G.C. vd Weyden (1981). **Preventie van loopsheid en/of dracht bij de hond door andere methoden dan ovario-hysterectomie. [Prevention of oestrus and/or pregnancy in dogs by methods other than ovariohysterectomy (author's transl)].** *Tijdschrift Voor Diergeneeskunde* 106(23): 1215-1225. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Abstract: The present paper is based on findings reported in the literature and concerned with various possible methods of preventing heat and/or pregnancy without resorting to ovariohysterectomy. The drugs used to suppress and prevent oestrus, such as progestagens, testosterone and 19-nortestosterone derivatives, are reviewed, the mechanism of action, mode of administration and advantages and disadvantages being discussed. Progestagens are particularly found to affect the uterus (CEH) and mammary glands (increased incidence of mammary tumours), and they may also induce diabetes mellitus and acromegaly. On the other hand, the untoward side-effects of 19-nortestosterone derivatives are found to be mainly due to their androgenic action, resulting in enlargement of the clitoris, vaginitis, changes of behaviour and masculinization of puppies when the drug is administered during pregnancy. Subsequently, those mechanical and surgical procedures which are less commonly employed, are discussed. The pros and cons of the various methods and drugs as well as the possible causes of the difference in gestagenic effect of a number of progestational agents are discussed in greater detail.

Descriptors: contraception, contraceptive agents, dogs, estrus, female, pregnancy, progestins, testosterone.

Language of Text: Dutch.

Owen, L.N. and M.H. Briggs (1976). **Contraceptive steroid toxicology in the beagle dog and its relevance to human carcinogenicity.** *Current Medical Research and Opinion* 4(5): 309-329. ISSN: 0300-7995.

Abstract: Problems associated with the use of the Beagle dog in chronic toxicological studies of contraceptive steroids are described. A short review is presented on the occurrence of spontaneous tumours in dogs and in bitches of various breeds. The current status of knowledge of canine reproductive hormones and endocrinology is outlined, together with effects of contraceptive steroids. The pathology and histological classification of spontaneous and induced mammary neoplasia in the dog is discussed and compared with breast cancer in women. A series of recommendations are included for future research in this field which it is hoped may resolve some of the outstanding issues and lead to a more suitable toxicological model for contraceptive steroids. Many scientists have criticized the mandatory use of dogs for studies of the chronic toxicity of synthetic steroidal contraceptive hormones. The estimated annual incidence rates for cancer of all sites in dogs is 381.2/100,000 dogs. The estimated relative risk (R) value for the occurrence of tumors in the Beagle breed is 0.9; for malignant tumors, the R value in the Beagle is 0.8. A review of the hormonal potency of various contraceptive steroids in the Beagles indicates that progestogenic compounds generally produce a much lower progestational activity in dogs than in women, and the predominant hormonal action of norethisterone in dogs is estrogenicity rather than progestogenicity. This weak activity for the canine species may account for some of the toxicological findings for norethisterone and related compounds in the Beagle. It is also possible that there are species differences in the relative affinities of estrogen and progesterone receptors for contraceptive steroids. Studies on long-term administration to female Beagle dogs suggest that the nodules found in the mammary gland are not histologically comparable to mammary tumors found in the human female although there is a superficial morphological resemblance to some forms of human mammary dysplasia. Several authors suggest that the results of testing progestational compounds in Beagles are unlikely to be indicative of a potential hazard to the human female. In testing megestrol acetate, it is suggested that the unique sensitivity of the canine females to megestrol acetate is exemplified by intense mammary development at dose levels 10 times the human oral contraceptive level. In contrast, daily dose levels of 500 mg/day in women as a palliative for endometrial cancer have been used with no serious side effects or mammary enlargement. Also the canine mammary gland produces certain pathological changes following administration of natural or synthetic progesterones in a way not readily seen in other species. Possible alternative models (cat, pig) for contraceptive steroid toxicological studies and recommendations for future research are discussed.

Descriptors: contraceptive agents, disease models, dogs, breast neoplasms, cats, chlormadinone acetate toxicity, pituitary analysis, mammary glands, mammary neoplasms, megestrol toxicity.

Palmer, C.W. and K. Post (2002). **Prevention of pregnancy in the dog with a combination of prostaglandin F2 alpha and bromocriptine.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 43(6): 460-462. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Abstract: Fifteen mated bitches were given prostaglandin F2 alpha (PGF2 alpha) [250 micrograms/kg body weight] and bromocriptine (10 micrograms/kg BW) twice daily from

days 6 to 10 of diestrus. Progesterone concentrations declined during treatment. None of the bitches whelped. Daily treatment with PGF2 alpha and bromocriptine for 5 d appears to induce luteolysis and prevent early pregnancy.

Descriptors: abortifacient agents, bromocriptine, methods of contraception, corpus luteum, hormone antagonists.

Pineda, M.H. and L.C. Faulkner (1974). **Immunologic control of reproduction in dogs.** *Canine Practice* 1(2): 11. ISSN: 0094-4904.

NAL Call Number: SF991.A1C3

Descriptors: laboratory animals, antibodies, chorionic gonadotropin, immunologic contraception, endocrine system, gonadotropins, luteinizing hormone.

Riesenbeck, A., R. Klein, and B. Hoffmann (2002). **Downregulation, a new and reversible approach to eliminate testicular function in the dog.** *Der Praktische Tierarzt* 83(6): 512-520. ISSN: 0032-681X.

NAL Call Number: 41.8 P882

Descriptors: downregulation, castration, dog, gonadotropin releasing hormone, prostatic hypertrophy, immunization, ovarian.

Romagnoli, S. and P. Concannon (2003). **Clinical use of progestins in bitches and queens: a review.** In: P. Concannon, G. England, J. Verstegen and C. Linde-Forsberg (editors), *Recent Advances in Small Animal Reproduction*, International Veterinary Information Service: Ithaca, NY.

Descriptors: progestins, dogs, cats, estrus cycle suppression, suppression of sexual behaviors, side effects, contraception, non-contraceptive uses, medroxyprogesterone acetate (MPA), melengesterol acetate (MGA), megestrol acetate (MA).

Sandow, J., W. von Rechenberg, C. Baeder, and K. Engelbart (1980). **Antifertility effects of an LH-RH analogue in male rats and dogs.** *International Journal Of Fertility* 25(3): 213-221. ISSN: 0020-725X.

NAL Call Number: 442.8 In83

Abstract: The antifertility effects of a highly active LH-RH analogue, D-Ser(Bu)6-LH-RH(1-9)nonapeptide-ethylamide (buserelin) were studied in male rats and dogs. Pituitary-testicular function was not impaired by a "physiological" dose of 5 ng/rat; this dose gave reproducible LH release during chronic administration. At higher dose testicular LH receptors and responsiveness to HCG were diminished in intact prepubertal and adult rats. Pituitary inhibition was independent of gonadal or adrenal steroid feedback, and hypothalamic LH-RH as well as pituitary LH and FSH were reduced by 4 weeks treatment of castrate/adrenalectomized rats with 50 ng buserelin. In male dogs, a dose of 2.5 micrograms/kg sc reduced serum testosterone to 6% of controls within 8 weeks of treatment. Treatment was continued for 6 months and testicular involution was found to be reversible within 8 weeks of stopping treatment. LH-RH analogues at "supraphysiological" doses can be used as antifertility agents, but suppression of sexual activity in male dogs under treatment indicates that loss of libido will be a problem.

Descriptors: adrenalectomy, buserelin, castration, dogs, drug effects on fertility, rats, gonadorelin, luteinizing hormone, testosterone.

Schaefers-Okkens, A.C. and H.S. Kooistra (1996). **Anticonceptiepillen voor de poes. [Contraceptive tablets for the cat].** *Tijdschrift Voor Diergeneeskunde* 121(7): 207. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: cats, oral contraceptives, estrus effects, progestins.

Language of Text: Dutch.

Schaefers-Okkens, A.C. and H.S. Kooistra (1996). **Progestageen gebruik [Use of progestagens].**

Tijdschr Diergeneeskd 121(11): 335-337. ISSN: 0040-7453.

Descriptors: animals, comparative study, contraceptive agents, dogs, estrus, female, medroxyprogesterone 17-acetate, progestins.

Language of Text: Dutch.

Selman, P.J., E. van Garderen, J.A. Mol, and T.S. van den Ingh (1995). **Comparison of the histological changes in the dog after treatment with the progestins medroxyprogesterone acetate and proligestone.** *The Veterinary Quarterly* 17(4): 128-133. ISSN: 0165-2176.

NAL Call Number: SF601.V46

Abstract: Administration of progestins in the dog may result in overproduction of growth hormone, suppression of the hypothalamic-pituitary-adrenocortical axis, and insulin resistance. In this paper we present a comparison of the histological findings in control dogs and dogs treated with either medroxyprogesterone acetate (MPA) or proligestone (PROL). Depot preparations of MPA or PROL were administered (SC) at 3-week intervals in two groups of seven ovariectomized beagle dogs, after which three dogs of each group were killed. After a 6-month period without hormone treatment during which recovery was studied, the remaining dogs received five additional injections at the same interval and were subsequently killed. Tissue samples of four intact female beagle dogs served as controls. Progestin treatment resulted in atrophy of the adrenal cortex. In both MPA- and PROL-treated dogs, the thickness of the combined zona fasciculata and reticularis was significantly smaller than in control animals. In the mammary glands of progestin-treated dogs there were well developed alveoli and normal ducts adjacent to foci of hyperplastic ductular epithelium. Five dogs in each treatment group had developed benign mammary tumours which varied from simple tubular and papillary adenomas to benign complex and mixed tumours, whereas no mammary tumours were observed in the control animals. In each treatment group, steroid-induced hepatopathy was observed in the liver of three dogs. Vacuolation of the cells of the islets of Langerhans and the epithelium of the intercalated ducts was present in two dogs of each treatment group and was only observed after the second series of progestin administrations. Incidental findings included chronic pyelonephritis, aspecific dermatitis, and mucinous dysplasia of the gall bladder. No abnormalities were found in sections of spleen, lung, brain, or pituitary gland. There were no significant differences in the frequencies of the various abnormalities between MPA- and PROL-treated dogs. Our findings correspond with the clinical and biochemical results after treatment of dogs with MPA and PROL. The high incidence of mammary tumours might be associated with our recent finding that in the dog progestins induce ectopic production of growth hormone in the mammary gland. The dog

might be a good model for further studies on hormonally induced breast cancers.

Descriptors: medroxyprogesterone acetate (MPA), proligestone (PROL), comparative study, contraceptive agents, hysterectomy, ovariectomy, adverse effects of progesterone and derivatives, dogs.

Snowball, S. and W. Taylor (1986). **The effect of a progestin-only oral contraceptive on biliary lipid composition in the cat.** *Journal of Steroid Biochemistry* 25(6): 1007-1011. ISSN: 0022-4731.

NAL Call Number: QD426.A1J6

Abstract: Following a control period of 5 weeks, 3 female cats with chronic gastric and duodenal fistulae were given 37.5 micrograms of the progestin D-norgestrel for 15 weeks. The study was continued for 8 weeks after withdrawal of treatment. Bile was collected via the duodenal fistula at 7-10 day intervals. During treatment the combined molar percentage of biliary cholesterol of all cats (4.2 +/- 0.4, n = 34) was significantly lower than during the control period (8.2 +/- 1.3, n = 11) [P = 0.001], and remained depressed after treatment withdrawal (5.5 +/- 1.0, n = 11) [P = 0.02]. The molar percentage of phospholipids remained unchanged in all animals, and that of total bile acids increased during treatment in one animal. As assessed by triangular coordinate plotting, the bile of each animal became less saturated with cholesterol during norgestrel administration. These results support the concept that the oestrogen component may be a major factor in the development of increased biliary cholesterol saturation in users of mixed-type oral contraceptives.

Descriptors: oral contraceptives, cats, bile acids and salts, norgestrel, cholesterol.

Stolla, R. (1970). **Ovulationshemmer in der Veterinärmedizin und in der Tierzucht? [Contraceptives in veterinary medicine and breeding]** . *Munchener Medizinische Wochenschrift* 112(7): 305. ISSN: 0027-2973.

Descriptors: breeding, cats, contraception, oral contraceptives, dogs , estrus, female, pregnancy.

Language of Text: German.

Sundaram, K. (1984). **Use of LHRH agonists and antagonists in male contraception: a review.** *Contraception* 29(2): 163-170. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: Agonists and antagonists of LHRH have been shown to inhibit testicular function in animals and are considered to offer potential for nonsteroidal contraception. In men, they offer one of the few promising approaches to reversible suppression of spermatogenesis. They do, however, also depress testosterone synthesis, thus causing loss of libido, necessitating the administration of supplemental androgens.

Descriptors: oral contraceptives, male contraception, inhibition of testicular function, nonsteroidal contraception, reversible suppression of spermatogenesis, testosterone, animals, humans.

Tremblay, Y. and A. Belanger (1984). **Reversible inhibition of gonadal functions by a potent gonadotropin-releasing hormone agonist in adult dog.** *Contraception* 30(5): 483-497. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: This study examines the recovery of spermatogenesis, testicular and plasma steroidogenesis and prostatic steroid content 26 weeks following cessation of daily treatment for 16 weeks with [D-Tryp6]LHRH ethylamide (LHRH-A) in the adult dog. While administration of LHRH agonist resulted in testicular and prostatic weight reductions of 40-60%, a complete recovery is observed 26 weeks after cessation of treatment. The number of sperm in LHRH-A-treated dogs declined rapidly in the first 4 weeks, after which no ejaculation or erection is observed in these animals. Spermatogenesis completely recovered four months following cessation of treatment. While testicular steroidogenesis is completely inhibited during the treatment with the agonist peptide, normal levels of testicular steroids are observed with the exception of 17-hydroxypregnenolone, dehydroepiandrosterone and androst-5-ene-3 beta,17 beta-diol which are elevated above control levels and, furthermore, an accumulation of these delta 5-steroids is also observed in the prostate after the end of treatment. Our data strongly suggest that chronic administration of an LHRH agonist may induce, after cessation of treatment, an overproduction of testicular steroids.

Descriptors: LHRH agonist, spermatogenesis, testosterone, androgens, dogs.

Tremblay, Y., A. Belanger, D. Lacoste, M. Giasson, and F. Labrie (1984). **Selective inhibition of spermatogenesis in the presence of normal libido following combined treatment with an LHRH agonist and testosterone in the dog.** *Contraception* 30(6): 585-588. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: In order to maintain libido in dogs treated with an LHRH agonist, animals were administered with testosterone in a gel form for percutaneous adsorption. Histological aspect of testis indicate a complete blockade of spermatogenesis after treatment with the LHRH agonist and the addition of testosterone to these animals did not restore the spermatogenesis. The measurement of testicular steroid levels showed that following LHRH-A administration, the concentration of androgens in testis remained low in the presence or absence of testosterone supplement. However, the prostate weight as well as the volume of ejaculate returned to normal when testosterone was added and this observation can be correlated with the high amount of androgens in prostate. The present study supports the use of LHRH agonist in combination with testosterone as a selective method for inhibition of spermatogenesis in the male.

Descriptors: dogs, LHRH agonist, libido, spermatogenesis inhibition, testosterone administration, contraception.

Trigg, T.E., P.J. Wright, A.F. Armour, P.E. Williamson, A. Junaidi, G.B. Martin, A.G. Doyle, and J. Walsh (2001). **Use of a GnRH analogue implant to produce reversible long-term suppression of reproductive function in male and female domestic dogs.** *Journal of Reproduction and Fertility* 57(Suppl.): 255-261. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: Continuous low-dose administration of a GnRH analogue postpones oestrus in bitches and suppresses reproductive function in dogs. A new drug delivery formulation that could enhance the practicality of this approach for the control of reproduction has been developed. The objective of the present study was to determine whether this method

of delivery could, by sustained release of the GnRH analogue deslorelin, act as a reversible anti-fertility agent in domestic male and female dogs for periods exceeding 1 year. Several long-term studies were performed, which monitored reproductive function in 30 dogs and 52 bitches. Suppression of reproductive function in male dogs was dose-related. Spermatogenesis was suppressed for more than a year in 14 of 16 dogs that received doses of > 0.25 mg deslorelin kg⁻¹. In females, postponement of oestrus for periods of up to 27 months was observed, but there was no relationship between the stage of the oestrous cycle at the start of treatment and the duration of efficacy. Treatment-induced effects on fertility were reversible in both sexes. In summary, sustained release deslorelin implants were shown to elicit reversible long-term reproductive control in male and female domestic dogs.

Descriptors: contraceptive implants, male and female dogs, GnRH analogue, deslorelin, anti-fertility, suppression of spermatogenesis, postponement of estrus.

van Os, J.L., P.H. van Laar, E.P. Oldenkamp, and J.S. Verschoor (1981). **Oestrus control and the incidence of mammary nodules in bitches, a clinical study with two progestogens.** *Tijdschrift Voor Diergeneeskunde* 106(2): 46-56. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Abstract: The incidence, size and location of mammary nodules were established in 10 practices in The Netherlands by the clinical examination of bitches in which oestrus was controlled with proligestone (P), 331 animals, or medroxyprogesterone acetate (MAP), 341 animals and in 339 animals never medicated with such compounds. In comparison with the unmedicated control and the P-medicated animals of comparable age the incidence of mammary nodules of all sizes was significantly increased in the MAP-medicated animals. There was no significant difference in nodule incidence between the P-medicated animals and the control animals. Based on the assumption that nodules above a certain size are most likely tumours, these results indicate that oestrus control with MAP stimulates tumour development even in animals medicated for less than four years. The practical value of the reported differences, especially in relation to the subsequent requirement for surgical removal of tumours in bitches, medicated for oestrus control, is discussed.

Descriptors: adverse effects of medroxyprogesterone acetate, mammary nodules, dogs, female, dog diseases, contraception.

Vickery, B.H. (1985). **Comparisons of the potential utility of LHRH agonists and antagonists for fertility control.** *Journal of Steroid Biochemistry* 23(5B): 779-791. ISSN: 0022-4731.

NAL Call Number: QD426.A1J6

Abstract: Prospects for the use of LHRH analogs for human fertility control have been reviewed with particular reference to two highly potent representatives. Nafarelin acetate, the LHRH agonist, has a potency about 200 X that of LHRH and is consistently effective in suppressing gonadal function in females through a desensitization of LHRH receptors in the pituitary. Such agents show promise as ovulation inhibitors for women although concern has been expressed over the dangers of unopposed estrogen or alternatively hypoestrogenemia. Although early studies indicated luteolysis in women and interceptive action in baboons it is now clear that the LHRH agonists will not be useful clinically to terminate pregnancy. Wide species differences in the male response to LHRH agonists exist. Unfortunately azoospermia has not been achieved in men. The LHRH antagonists, typified by [N-Ac-D-Nal(2)1,

D-pCl-Phe², D-Trp³, D-hArg(Et²)⁶, D-Ala¹⁰]LHRH, require high doses to competitively inhibit responses to endogenous LHRH. Their advantages include a rapid induction of the hypogonadal state with apparently little species or sexual variation in response. Based on animal studies, preferable utility of the antagonists would lie in male contraception and pregnancy interception.

Descriptors: fertility control, human, animal studies, male contraception, LHRH, ovulation inhibitors.

Vickery, B.H., G.I. McRae, J.C. Goodpasture, and L.M. Sanders (1989). **Use of potent LHRH analogues for chronic contraception and pregnancy termination in dogs.** *Journal of Reproduction and Fertility Supplement* 39: 175-187. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Descriptors: abortifacient agents, pharmacology, dogs, contraceptive agents, estrus, gonadorelin, nafarelin.

Von Berky, A.G. and W.L. Townsend (1993). **The relationship between the prevalence of uterine lesions and the use of medroxyprogesterone acetate for canine population control.** *Australian Veterinary Journal* 70(7): 249-250. ISSN: 0005-0423.

NAL Call Number: 41.8 Au72

Abstract: The prevalence of uterine disease was established during desexing of 175 bitches in the Torres Strait and Cape York, 42 of which had been treated with injectable medroxyprogesterone acetate (MPA) for oestrus postponement. The prevalence of uterine lesions was 45% for treated bitches, 5% for untreated bitches, and 14.9% for the sample population. A highly significant relationship ($P < 0.01$) between MPA treatment and uterine lesions was established. A significant association ($P < 0.05$) between age (> 2 years old) and uterine lesions was found, most likely attributable to a significantly higher proportion ($P < 0.01$) of MPA-treated bitches in the older population. There was no significant difference in the effect of MPA on the prevalence of uterine lesions between older and younger bitches. There was no effect of parity on the prevalence of uterine lesions.

Descriptors: estrus postponement, medroxyprogesterone acetate, uterine lesions, adverse effects, ovariectomy, dogs.

Weikel, J.H.J., L.W. Nelson, and F.E. Reno (1975). **A four-year evaluation of the chronic toxicity of megestrol acetate in dogs.** *Toxicology And Applied Pharmacology* 33(3): 414-426. ISSN: 0041-008X.

NAL Call Number: 391.8 T662

Abstract: A 4-year evaluation of the chronic toxicity of megestrol acetate in dogs is reported. .01, .1 or .25 mg of megestrol acetate/kg/day or .25 mg of chlormadinone acetate/kg/day was administered orally for 4 years to female beagle dogs. The hormone-treated dogs tended to gain more weight than did the controls (controls vs. .25 mg megestrol acetate every month after the 3rd p less than .01). All treated dogs revealed decreased evidence of estrus. Mucoïd vaginal discharges were more prevalent among the middle and high dose groups. Mean hemoglobin, packed cell volume and total erythrocyte values were slightly decreased while mean total leucocyte count and erythrocyte sedimentation rates were slightly increased in the middle and high dose groups. Clotting mechanism did not reveal any disturbances. Evi-

dence of diabetes consistin g of bilateral cataracts, elevated serum glucose concentrations and glycosuria after 4 years in 2 of 16 high-dose megestrol acetate and in 6 of 15 chlormadinone acetate-treated dogs was revealed. It is concluded that the effects of megestrol acetate were similar but less severe than those of chlormadinone acetate.

Descriptors: megestrol acetate, dogs, chlormadinone acetate, females, weight gain, vaginal discharge, ovulation, comparison study.

Weikel Jr., J.H. and L.W. Nelson (1977). **Problems in evaluating chronic toxicity of contraceptive steroids in dogs.** *Journal of Toxicology and Environmental Health* 3(1-2): 167-177. ISSN: 0098-4108.

NAL Call Number: RA565.A1J6

Abstract: The long-term effects of oral contraceptive steroids including a combination of norethindrone and ethynylestradiol, a sequential regimen of dimethisterone and ethynylestradiol, and daily administration of megestrol acetate were studied in female beagle dogs at dose levels of 1, 10, or 25 times the projected human dose levels. The major findings included cystic endometrial hyperplasia and pyometra requiring hysterectomies and alopecia for the norethindrone-ethynylestradiol and dimethisterone-ethynylestradiol treated dogs. These groups did not have accentuated mammary development or treatment-related hyperplastic or neoplastic changes. For dogs given dimethisterone-ethynylestradiol, numerous acne-like lesions occurred in the skin of the mammary areas. Dogs given the higher dose levels of megestrol acetate had marked mammary stimulation, hyperplastic and neoplastic changes in the mammary glands, and clinical and pathologic changes typical of diabetes mellitus. Mammary changes of nodular hyperplasia, benign mixed tumor, and adenocarcinoma appeared as distinct entities although constant and intense mammary stimulation may be a common denominator. Such mammary changes have not been found in long-term studies in monkeys or rats with megestrol acetate, and the relevance of the canine mammary changes to projecting potential tumorigenesis in women is questioned.

Descriptors: oral contraceptives, norethindrone, ethynylestradiol, megestrol acetate, dogs, complications, alopecia, endomedrial hyperplasia, hysterectomy, mamamary changes, tumorigenesis, animal models.

Wright, P.J., J.P. Verstegen, K. Onclin, W. Jochle, A.F. Armour, G.B. Martin, and T.E. Trigg (2001). **Suppression of the oestrous responses of bitches to the GnRH analogue deslorelin by progestin.** *Journal of Reproduction and Fertility* 57(Suppl.): 263-268. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: Studies were undertaken in Australia and Belgium to determine whether the initial pro-oestrous-oestrous responses of anoestrous bitches to treatment with deslorelin administered in a s.c. implant were inhibited by progestin treatment. Thirty-nine bitches of mixed breeding were treated daily with 2 mg megestrol acetate kg⁻¹ body weight for 21 (group 1, n = 5) or 14 days (group 2, n = 10), or with 1 mg megestrol acetate kg⁻¹ body weight for 14 days (group 3, n = 10). A deslorelin (6 mg) implant was placed s.c. on day 14 (group 1) or day 7 (groups 2 and 3) of treatment. Bitches not treated with progestin also received a deslorelin implant (group 4, n = 9) or were untreated controls (group 5, n = 9). Signs of pro-oestrus-oestrus were not observed in bitches in groups 1, 2 and 5, but were observed in bitches in groups 3 (4/10) and 4 (9/9). Four bitches in group 4 were mated, two of which

became pregnant. The pregnancies failed at about day 40 of gestation and were associated with low plasma progesterone concentrations. Treatment with progestin inhibited the pro-oestrous-oestrous responses of bitches to deslorelin.

Descriptors: deslorelin, contraceptive implants, dogs, plasma progesterone concentration, progestin, pregnancy.

Immunological Approaches to Contraception

Barber, M.R. and R.A. Fayrer-Hosken (2000). **Evaluation of somatic and reproductive immunotoxic effects of the porcine zona pellucida vaccination.** *The Journal of Experimental Zoology* 286(6): 641-646. ISSN: 0022-104X.

NAL Call Number: 410 J825

Abstract: Immunological, immunocytochemical and fertility analyses were performed to determine the potential toxic side effects of porcine zona pellucida (pZP) vaccinations on target animals, including horses and dogs. The study was designed to determine the effect of antibodies, raised against highly purified pZP, on somatic tissues. Immunocytochemical studies performed with fixed tissues showed that rabbit anti-pZP antiserum did not cross-react with brain, heart, lung, kidney, liver, bladder, stomach, small intestine, large intestine, muscle, skin, spleen, pancreas, or lymph node of either the dog or horse. To determine the effect of oral intake on nontarget animals, female rabbits were fed a contraceptive vaccine containing pZP glycoproteins and the synthetic trehalose dicorynomycolate in drakeol (S-TDCM) adjuvant. Enzyme-linked immunoadsorbent assay (LISA) analyses showed that rabbits fed with the adjuvanted pZP proteins did not develop circulating anti-pZP IgG antibodies that crossreacted with pZP. Furthermore, fertility studies performed on rabbits fed with adjuvanted pZP revealed no significant differences in the number of embryos or stage of the embryos produced between the treated and control animals. Results of these studies suggest that the pZP vaccine delivered to dogs or horses in field studies have no recognizable somatic tissue effects. Moreover, there were no side effects on nontarget animals should they eat the vaccine. This substantiates field trials results about the safety of the pZP immun contraceptive vaccine.

Descriptors: animals, antibody formation, immunologic contraception, dogs, egg proteins, enzyme-linked immunosorbent assay, horses, immunoenzyme techniques, immunoglobulin G analysis, membrane glycoproteins, rabbits, swine, vaccines, zona pellucida.

Barber, M.R. and R.A. Fayrer-Hosken (2000). **Possible mechanisms of mammalian immuncontraception.** *Journal of Reproductive Immunology* 46(2): 103-124. ISSN: 0165-0378.

NAL Call Number: QR180.J64

Abstract: Ecological and conservation programs in ecosystems around the world have experienced varied success in population management. One of the greatest problems is that human expansion has led to the shrinking of wildlife habitat and, as a result, the overpopulation of many different species has occurred. The pressures exerted by the increased number of animals has caused environmental damage. The humane and practical control of these populations has solicited the scientific community to arrive at a safe, effective, and cost-efficient means of population control. Immuncontraception using zona pellucida antigens, specifically porcine zona pellucida (pZP), has become one of the most promising population control tools in the world today, with notable successes in horses and elephants. A conun-

drum has risen where pZP, a single vaccine, successfully induces an immunocontraceptive effect in multiple species of mammals. This review describes the most current data pertaining to the mammalian zona pellucida and immunocontraception, and from these studies, we suggest several potential mechanisms of immunocontraception.

Descriptors: animals, immunologic contraception, egg proteins, female, glycosylation, human, lectins, male, membrane glycoproteins, oligosaccharides, ovarian diseases, sperm-ovum interactions, adverse effects of vaccinations, zona pellucida.

Barber, M.R., S.M. Lee, W.L. Steffens, M. Ard, and R.A. Fayrer-Hosken (2001). **Immunolocalization of zona pellucida antigens in the ovarian follicle of dogs, cats, horses and elephants.** *Theriogenology* 55(8): 1705-1717. ISSN: 0093-691X.

NAL Call Number: QP251.A1T5

Abstract: A comparative evaluation of the location of immunoreactive porcine zona pellucida (pZP) glycoproteins was performed with polyclonal rabbit anti-pZP antibodies on ovarian sections of the dog, cat, horse, and elephant. For this, formalin (light microscopy) and glutaraldehyde (transmission electron microscopy [TEM]) fixed ovarian sections were incubated with antibodies raised against highly purified pZP. Staining patterns were determined with diaminobenzidine (DAB) at the light level. The dog ZP had a distinct staining distribution that is characterized by intense staining around the periphery of the ZP and the oolemma and less dense staining throughout the width of the ZP. In dog follicles that contained multiple oocytes, there were oocytes of identical and dissimilar stages. Cat ovarian sections showed uniform staining of the ZP. Horse results showed uniform staining of ZP and ooplasm, and granulosa cells (GC). Elephant sections showed staining of the ZP with dense staining at the oolemma, as well as staining of the ooplasm. In all species the staining of the ZP was not evident until GC differentiation. In all cases there was no staining of ovarian tissue with control normal rabbit serum. Specific staining patterns of ZP were evaluated by TEM and immunogold staining. The immunogold-linked anti-pZP antibodies stained the ZP matrix in all species. There was staining of ooplasm organelles suggesting that ZP secretion originates from the oocyte of the dog and cat. In addition, follicular and ZP measurements were taken that allowed accurate characterization of follicle stage. These findings suggest that in all four species the ZP is recognized by anti-pZP antibodies and there is also evidence to suggest the possible origins of ZP glycoproteins.

Descriptors: cats, immunologic contraception, dogs, elephants, horses, immunoglobulin g, electron microscopy, ovary, species specificity, zona pellucida.

Courchamp, F. and S.J. Cornell (2000). **Virus-vectored immunocontraception to control feral cats on islands: a mathematical model.** *The Journal of Applied Ecology* 37(6): 903-913. ISSN: 0021-8901.

NAL Call Number: 410 J828

Descriptors: cats, wild animals, vertebrate pests, pest control, biological control, population control, integrated control, contraception, baits, vectors, viruses, genetic engineering, mathematical models, islands, genetically modified viral vectors.

Dunbar, B.S., G. Kaul, M. Prasad, and S.M. Skinner (2002). **Molecular approaches for the evaluation of immune responses to zona pellucida (ZP) and development of second-generation ZP vaccines.** *Reproduction Supplement* 60: 9-18. ISSN: 1477-0415.

NAL Call Number: QP251.J75 Suppl.

Abstract: It has long been established that there are major variations in both the immunogenicity and antigenicity of native zona pellucida (ZP) proteins. These differences appear to be more pronounced with respect to genetically engineered ZP proteins, which do not have native post-translational modifications (for example glycosylation and sulphation). As the number of animal species that are now included in population management programmes using native porcine zona pellucida (PZP) proteins expands, it is increasingly important to carry out studies to evaluate the immune response variations among different species as well as the individual variation within a species. In an attempt to compare these complex immune responses, we have evaluated antibodies from numerous species immunized with native, genetically engineered ZP and synthetic ZP peptides. Such an immunocontraceptive method could have great potential. These studies are critical not only for the development of predictable immune responses that result in permanent sterilization versus reversible contraceptive effects, but also for predicting which vaccinogens (native ZP protein versus genetically engineered ZP proteins) might have detrimental effects on animal and human populations.

Descriptors: vaccinogens, immunologic contraception, egg proteins, zona pellucida, dogs, membrane glycoproteins, contraceptive vaccines, population control.

Fayrer-Hosken, R.A., H.D. Dookwah, and C.I. Brandon (2000). **Immunocontrol in dogs.** *Animal Reproduction Science* 60-61: 365-373. ISSN: 0378-4320.

NAL Call Number: QP251.A5

Abstract: Population control in dogs and cats is an important goal for many groups. Control measures over the years has included surgery, hormonal therapy and more recently immunological control. The current presentation discusses dog population control with an emphasis on immunologic control. Specifically, vaccination with purified zona pellucida (ZP) glycoproteins leads initially to immunocontraception and then to the profound and irreversible changes of immunosterilization. The preliminary studies are extremely encouraging on developing a vaccine for lasting canine population control.

Descriptors: dogs, egg proteins, membrane glycoproteins, population control, methods of sterilization, vaccination.

Ferro, V.A., M.A.H. Khan, V.S. Latimer, D. Brown, H.F. Urbanski, and W.H. Stimson (2001).

Immunoneutralisation of GnRH-I, without cross-reactivity to GnRH-II, in the development of a highly specific anti-fertility vaccine for clinical and veterinary use. *Journal of Reproductive Immunology* 51(2): 109-129. ISSN: 0165-0378.

NAL Call Number: QR180.J64

Descriptors: anti-fertility vaccine, neutralisation, GnRH, active immunization, rats, luteinizing hormone, immunocastration, toxicity.

Fraser, H.M., A. Gunn, R. Borthwick, and A.F. Fraser (1975). **Letter: Sterilising by immunisation.** *The Veterinary Record* 96(14): 323. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: dogs, female, gonadorelin, immunization, male, methods of sterilization.

Fromme, B., P. Eftekhari, M. Van Regenmortel, J. Hoebeke, A. Katz, and R. Millar (2003). **A novel retro-inverso gonadotropin-releasing hormone (GnRH) immunogen elicits antibodies that neutralize the activity of native GnRH.** *Endocrinology* 144(7): 3262-3269. ISSN: 0013-7227.

NAL Call Number: 448.8 EN2

Descriptors: dependent cancers, vaccines, fertility, receptor, peptides, cells.

Gonzalez, A., A.F. Allen, K. Post, R.J. Mapletoft, and B.D. Murphy (1989). **Immunological approaches to contraception in dogs.** *Journal of Reproduction and Fertility Supplement* 39: 189-198. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: The demand for safe, effective and cost-efficient means of pet population control has generated interest in the development of alternatives to surgical gonadectomy. The purpose of this review is to discuss the potential of immunological approaches to fertility control and to outline recent developments that may aid their design. Among the most promising candidates for immunoneutralization is gonadotrophin releasing hormone (GnRH). We have developed a reliable and reproducible GnRH-protein conjugate antigen and demonstrated that immunologically induced infertility is possible in dogs.

Descriptors: immunologic adjuvants, antibody formation, contraception, dogs, pituitary hormone releasing hormones, zona pellucida.

Gorman, S.P., J.K. Levy, A.L. Hampton, W.R. Collante, A.L. Harris, and R.G. Brown (2002). **Evaluation of a porcine zona pellucida vaccine for the immunocontraception of domestic kittens (*Felis catus*).** *Theriogenology* 58(1): 135-149. ISSN: 0093-691X.

NAL Call Number: QP251.A1T5

Abstract: With a seasonally polyestrus breeding structure, the unwanted domestic cat population has proven difficult to control. Various lethal methods have been used in an attempt to lower this population of cats. Recently, humane attempts to control "pest species," such as the feral cat, have focused on immunocontraception. SpayVac is a vaccine that uses antibodies raised against porcine (ZP) antigens to prevent fertilization of the ovum. SpayVac, delivered in a single dose, has been evaluated in fallow deer and several species of seals with greater than or equal to 90% reduction in fertility and no adverse reactions. This study evaluated the effectiveness of SpayVac in reducing fertility in domestic kittens. Thirty female kittens were treated with SpayVac containing either Freund's complete adjuvant (FCA) or alum, or with a control vehicle. Kittens were monitored for side effects, estrus cycling at maturity, and fecundity. Anti-porcine ZP antibodies were quantified by ELISA. Immunohistochemical assays measured the species specificity of the antibodies produced and IgG binding in vivo. Despite high anti-porcine ZP antibody titers, neither formulation of SpayVac prevented estrus cycling at maturity or reduced fecundity. Immunohistochemical assays indicated that antibodies pro-

duced by cats treated with SpayVac recognized porcine ZP, but not feline ZP.

Descriptors: cats, contraception, antibody formation, pigs, zona pellucida, vaccine development, vaccination, adjuvants, elisa, immunohistochemistry, ovaries.

Gupta, S.K., N. Srivastava, C.K. Govind, N. Sivapurapu, and G.K. Gahlay (2000). **Comparative molecular biology and immunobiology of zona pellucida glycoproteins: fundamentals and applied aspects for contraception.** *Proceedings of the Indian National Science Academy, Part B: Biological Sciences* 66(1): 33-48. ISSN: 0370-0097.

Descriptors: acrosome reaction, fertilization, immunocontraceptive vaccine, sperm-oocyte binding.

Hassan, T., R.E. Falvo, V. Chandrashekar, B.D. Schanbacher, and C. Awoniyi (1985). **Active immunization against LHRH in the male mongrel dog.** *Biology of Reproduction* 32(Suppl. 1): 222. ISSN: 0006-3363.

NAL Call Number: QL876.B5

Descriptors: LHRH, immunocontraception, dogs.

Horoz, H., C.S. Konuk, K. Gurbulak, G. Kasikci, M.E.C. Sonmez, and A. Gurel (2000). **The effect of intrauterine device (IUD) administration on fertility, serum progesterone, oestradiol 17 beta and uterine endometrium during the induced estrus cycle in the bitch.** *Veteriner Fakultesi Dergisi Istanbul* 26(2): 325-335. ISSN: 0378-2352.

Descriptors: bitches, clinical aspects, endometritis, endometrium, estradiol, female infertility, intrauterine devices, estrous cycle, oestrus, progesterone, pyometra, dogs.

Language of Text: Turkish.

Ivanova, M., M. Petrov, D. Klissourska, and M. Mollova (1995). **Contraceptive potential of porcine zona pellucida in cats.** *Theriogenology* 43(5): 969-981. ISSN: 0093-691X.

NAL Call Number: QP251.A1T5

Abstract: The contraceptive potential of solubilized porcine zona pellucida (spZP) was studied in 2 groups of cats after active immunization using slightly different protocols. Cats from Group 1 (n = 3) were immunized with a total of 300 8g spZP divided in 4 sc multisite injections (each of 37.5 8g) given at 10 day intervals followed by a booster 150 days after the initial immunization. Cats from Group 2 (n = 5) were immunized with a total of 400 8g spZP divided in 4 im injections (each of 50 8g) given at 2 wk intervals followed by a booster 92 days after initial immunization. Immunogen was emulsified in Complete Freund Adjuvant for the first dose and in Incomplete Freund Adjuvant for the following 3 doses. The respective controls were immunized in the same manner using only adjuvant and PBS.

Descriptors: cats, contraceptives, zona pellucida, pigs, immunization, antibody formation, binding proteins, immunofluorescence, oocytes, spermatozoa, Bulgaria.

Jewgenow, K., M. Rohleder, and I. Wegner (2000). **Differences between antigenic determinants of pig and cat zona pellucida proteins.** *Journal of Reproduction and Fertility* 119(1): 15-23. ISSN: 0022-4251.

Abstract: Despite many efforts, the control of reproduction in feral cat populations is still a problem in urban regions around the world. Immunocontraception is a promising approach;

thus the present study examined the suitability of the widely used pig zona pellucida proteins (pZP) for contraception in feral domestic cats. Purified zona pellucida proteins obtained from pig and cat ovaries were used to produce highly specific antisera in rabbits. Antibodies against pZP raised in rabbits or lions were not effective inhibitors of either in vitro sperm binding (cat spermatozoa to cat oocytes) or in vitro fertilization in cats, whereas antibodies against feline zona pellucida proteins (fZP) raised in rabbits showed a dose-dependent inhibition of in vitro fertilization. Immunoelectrophoresis, ELISA and immunohistology of ovaries confirmed these results, showing crossreactivity of anti-fZP sera to fZP and to a lesser extent to pZP, but no interaction of anti-pZP sera with fZP. It is concluded that cat and pig zonae pellucidae express a very small number of shared antigenic determinants, making the use of pZP vaccine in cats questionable. A contraceptive vaccine based on feline zona pellucida determinants will be a better choice for the control of reproduction in feral cats if immunogenicity can be achieved.

Descriptors: cats, contraception, egg proteins, cross reactions, enzyme linked immunosorbent assay methods, fertilization in vitro, immunohistochemistry, lions, rabbits, sperm-ovum interactions, immunology.

Jewgenow, K. and M. Rudolph (2001). **Timing and location of zona pellucida synthesis during oogenesis in domestic cats--an ultrastructural immunohistological investigation.** *Journal of Reproduction and Fertility* 57(Suppl.): 23-29. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: The application of zona pellucida proteins for contraception of wildlife and feral animals, including stray cats, has been promoted since it was demonstrated to be effective for free-roaming feral mares. Active immunization with zona pellucida proteins leads to either reversible or irreversible infertility. Therefore, knowledge of the timing and location of zona pellucida synthesis during oogenesis in cats is a key aspect of designing an immun contraceptive for felids. Domestic cat ovaries obtained after ovariohysterectomy were used to produce a specific rabbit antibody against feline zonae pellucidae. Ultrathin sections (70 nm) of cat ovaries were treated with the anti-zona antibody followed by incubation with gold-labelled anti-rabbit IgG for ultrastructural investigation. The gold label was related to the ultrastructure of oocytes and granulosa cells. Cat follicles at different stages of development were examined. The antibody reacted very specifically with zona pellucida proteins in fully grown oocytes with a compact zona pellucida. In secondary follicles, gold labels were found on the zona pellucida and inside granulosa cells in the vicinity of oocytes. Primary follicles were labelled inside their cubic granulosa cells and on fragments of zona pellucida in the cleft between granulosa cells and the oocyte. Some primordial follicles were characterized by labelling of the granulosa cells. In conclusion, these results indicate that cat zona pellucida is produced exclusively by granulosa cells and not by oocytes. Synthesis of zona pellucida takes place at every stage of follicular development.

Descriptors: antibodies, cats, egg proteins, granulosa cells, immunoglobulin g, immunohistochemistry, electron microscopy, oogenesis, rabbits, zona pellucida.

Lacoste, D., R. St-Arnaud, S. Caron, A. Belanger, and F. Labrie (1988). **The rise in testicular androgens during the first days of treatment with an LHRH agonist in the dog can be blocked by aminoglutethimide or ketoconazole.** *Journal of Steroid Biochemistry* 31(6): 963-970.

ISSN: 0022-4731.

NAL Call Number: QD426.A1J6

Descriptors: luteinizing hormone releasing hormone, androgens, aminoglutethimide, ketoconazole, receptors, agonists, effects on, serum levels, inhibition, dogs.

Ladd, A., G. Prabhu, Y.Y. Tsong, T. Probst, W. Chung, and R.B. Thau (1988). **Active immunization against gonadotropin-releasing hormone combined with androgen supplementation is a promising antifertility vaccine for males.** *American Journal of Reproductive Immunology and Microbiology* 17(4): 121-127. ISSN: 8755-8920.

NAL Call Number: QR180.A53

Abstract: Male rats and rabbits were immunized against gonadotropin-releasing hormone (GnRH) conjugated to tetanus toxoid (GnRH10-TT) using only materials approved for humans. Testosterone (T)-releasing implants or the long-lasting T ester testosterone-17-trans-4-n-butyl-cyclohexane carboxylate (TE) was used as supplemental androgen for maintaining libido. Immunization against GnRH10-TT effectively suppressed fertility (spermatogenesis) in rats and rabbits. Neither T nor TE administration restored fertility. Both androgens were effective in maintaining normal libido in rats. TE, which is not hydrolyzed in rabbits, was less effective in maintaining normal ejaculatory behavior in this species. Active immunization against GnRH could be a convenient and cost-effective method of fertility control in males.

Descriptors: androgens, antibody formation, epididymis, fertility, follicle stimulating hormone, gonadorelin, luteinizing hormone, male, organ weight, prostate, rabbits, rats, seminal vesicles.

Ladd, A., Y.Y. Tsong, A.M. Walfield, and R. Thau (1994). **Development of an antifertility vaccine for pets based on active immunization against luteinizing hormone-releasing hormone.** *Biology of Reproduction* 51(6): 1076-1083. ISSN: 0006-3363.

NAL Call Number: QL876.B5

Abstract: Male dogs and cats were immunized against LHRH in order to evaluate the feasibility of an immunological approach to pet contraception. In the first study, dogs were immunized with 100, 500, or 2500 micrograms of LHRH conjugated to tetanus toxoid. A significant decline in serum testosterone (T) levels was observed in all immunized dogs, reaching castration levels in some animals by Week 4 and remaining suppressed in all the immunized dogs through the course of the study. Testicular histology suggested arrest of spermatogenesis (infertility). The effects of "immunological castration" were reversible (study 2): steroidogenesis suppressed by "immunological castration" was restored as antibody titers declined. Effective antibodies were rapidly reinduced in dogs by a single injection of LHRH1-TT. In contrast, the level of antibodies induced in male cats (study 3) was not sufficient for "immunological castration." The conclusion was that active immunization against LHRH could provide a cost-effective, nonsurgical, reversible means to control the fertility of companion animals.

Descriptors: pets, antifertility vaccine, immunologic contraception, gonadorelin, immunization against LHRH, reversible contraception.

Mahi-Brown, C.A., T.T. Huang Jr, and R. Yanagimachi (1982). **Infertility in bitches induced by active immunization with porcine zonae pellucidae.** *The Journal of Experimental Zoology* 222(1): 89-95. ISSN: 0022-104X.

NAL Call Number: 410 J825

Abstract: In a study designed to evaluate the contraceptive potential of anti-egg zona pellucida immunization, bitches were injected with isolated and solubilized zonae pellucidae of either the pig or the dog in saline and Freund's adjuvant or with saline and adjuvant alone (controls). They were boosted monthly, and serum samples were collected before the first injection and 10 days after each injection. The titers of anti-zona pellucida antibodies in each serum sample were measured by treating fresh canine oocytes with the serum, then evaluating antibody binding as indicated by indirect immunofluorescence, precipitation of the zona surface, and penetrability of the zonae by spermatozoa in vitro. The bitches were bred when they came into estrus. All three bitches immunized with porcine zonae developed high titers (1:10,000 or more by indirect immunofluorescence) of antibodies that cross-reacted with canine zonae to cause precipitation of the zona surface both in vivo and in vitro and that completely inhibited penetration of the zonae by spermatozoa in vitro. The two bitches immunized with canine zonae developed only low titers, and their sera had little or no effect on treated zonae. The two control bitches did not develop anti-zona antibody. None of the bitches immunized against porcine zonae became pregnant when bred, but one bitch immunized against canine zonae and one control did become pregnant. The bitches immunized with porcine zonae had somewhat abnormal cycles for unknown reasons. Thus, we could not establish with certainty whether the infertility resulted from specific interference with fertilization, as in vitro, or from alterations in ovarian function, or both.

Descriptors: antibodies, cattle, comparative study, dogs, estrus, female, fertility, immunization, oocytes, ovum, zona pellucida.

Mahi-Brown, C.A., R. Yanagimachi, J.C. Hoffman, and T.T. Huang Jr (1985). **Fertility control in the bitch by active immunization with porcine zonae pellucidae: use of different adjuvants and patterns of estradiol and progesterone levels in estrous cycles.** *Biology of Reproduction* 32(4): 761-772. ISSN: 0006-3363.

NAL Call Number: QL876.B5

Abstract: To determine the changes in patterns of 17 beta-estradiol and progesterone levels underlying abnormal cycles in bitches immunized with solubilized crude porcine zonae pellucidae (cPZP), to attempt to circumvent these problems by immunizing with a purified zona fraction (pPZP), and to test the effectiveness of different adjuvants, bitches were immunized with cPZP or pPZP 2-6 times with no adjuvant, Freund's adjuvant, alum adjuvant, or the adjuvant CP-20,961. The bitch immunized without adjuvant had a low titer with a normal cycle and fertility. Immunization with cPZP and adjuvant produced moderate to high titers of antizona antibodies and infertility. Bitches with high titers experienced abnormal estrous cycles. Estradiol rose during proestrus, but instead of falling sharply in early estrus as in controls, it remained elevated. Progesterone did not rise. The moderate-titered bitches had normal cycles and steroid patterns. Bitches immunized with pPZP had moderate titers. Cycles were normal after 3 injections, but after 6 injections one bitch had an abnormal cycle. One pPZP-immunized bitch remained fertile but the others were infertile. Alum was the mildest adjuvant, causing no injection site lesions, but the highest titers occurred with

Freund's and CP-20,961 adjuvants. All three adjuvants induced titers sufficient to inhibit fertility. Infertility in bitches immunized with PZP may be due to prevention of zona penetration, because their antisera inhibited zona penetration of oocytes by spermatozoa in vitro. However, alterations in ovarian function preventing ovulation and luteinization could be involved in high-titered bitches.

Descriptors: immunologic adjuvants, antibodies, contraception, diamines, dogs, estradiol, blood, estrus, fertility, Freund's adjuvant, immunization, ovum, progesterone, zona pellucida.

Mahi-Brown, C.A., R. Yanagimachi, M.L. Nelson, H. Yanagimachi, and N. Palumbo (1988).

Ovarian histopathology of bitches immunized with porcine zonae pellucidae. *American Journal of Reproductive Immunology and Microbiology* 18(3): 94-103. ISSN: 8755-8920.

NAL Call Number: QR180.A53

Abstract: The ovarian histopathology of bitches immunized with crude (cPZP) or partially purified (pPZP) porcine zona pellucida proteins was examined in order to determine the cause of abnormal estrous cycles. The majority of immunized bitches had ovarian cytes. Those immunized with cPZP had follicular cysts lined with a thin layer of granulosa cells, while in those immunized with pPZP, the cysts were lined by a basement membrane with a clump of luteinized cells. In two bitches immunized with cPZP, oocytes were present only in primordial follicles. Similar abnormalities were not found in a bitch immunized with human serum albumin or in 12 untreated bitches. Oocytes flushed from the oviducts of mated, immunized bitches were degenerating, which may have been a primary cause of infertility in such bitches. Ovaries studied 2-6 weeks after immunization showed no loss of gap junctional communication between oocytes and granulosa cells, nor was any inflammatory reaction seen. IgG was bound to the zona as revealed by fluoresceinated protein A staining of frozen sections of those ovaries. Abnormal estrous cycles in PZP-immunized bitches appear to result from follicular dysgenesis or cyst formation, but the etiology of these conditions is unresolved.

Descriptors: immunologic contraception, dogs, estrus, fertilization, immunization, ovary, ovulation, swine, uterus, zona pellucida.

Mahi, C.A. and R. Yanagimachi (1979). **Prevention of in vitro fertilization of canine oocytes by anti-ovary antisera: a potential approach to fertility control in the bitch.** *The Journal of Experimental Zoology* 210(1): 129-135. ISSN: 0022-104X.

NAL Call Number: 410 J825

Abstract: Antisera raised against canine ovaries were found to induce light scattering of the surface of the egg zona pellucida even when diluted 10,000 times, and to delay digestion of the zona by pronase. High concentrations of antiserum were required, however, to inhibit in vitro fertilization of the oocytes. Absorption of the antisera with canine ovaries removed these effects, whereas absorption with liver, uterus and serum did not. These results demonstrate the antigenicity of the canine ovary and suggest the plausibility of an anti-zona pellucida vaccine for birth control in the bitch.

Descriptors: contraception, dogs, female, fertilization in vitro, immune sera, oocytes, ovary, pronase, rabbits, sperm-ovum interactions, zona pellucida.

Mircu, C., H. Cernescu, G.H. Ghize, G.H. Bonca, V. Ardelean, and V. Igna (2001). **The influence of immunization with porcine zona pellucida upon bitch ovaries.** *Acta Veterinaria* 51(4): 235-244. ISSN: 0567-8315.

NAL Call Number: 41.8 V6447

Descriptors: immunocontraception, veterinary medicine, dogs, zona pellucida, meiotic competence, ovarian structure.

Navarrete, G. (1997). *Castracion quimica en perros machos con Digluconato de Clorhexidina al 3% en Dimetil Sulfoxido al 50%. [Chemical castration in male dogs with chlorhexidine digluconate at 3% in DMSO [Dymethyl Sulfoxide] at 50%]*. Dissertation, Concepcion University, Fac. de Medicina Veterinaria: Chillan, Chile. 79 p.

Descriptors: dogs, males, castration, chemicals, animal husbandry methods, canidae, carnivora, gonadectomy, mammals, sex, sterilization, surgical operations.

Language of Text: Spanish.

Sabeur, K., B.A. Ball, T.M. Nett, H.H. Ball, and I.K. Liu (2003). **Effect of GnRH conjugated to pokeweed antiviral protein on reproductive function in adult male dogs.** *Reproduction* 125(6): 801-806. ISSN: 1470-1626.

NAL Call Number: QP251.J75

Abstract: This study evaluated the effect of a GnRH analogue conjugated to the cytotoxin, pokeweed antiviral protein (PAP), on reproductive function in adult, male dogs. Four dogs received 0.0042 mg GnRH-PAP kg(-1) hourly for 36 h, and four other dogs received 0.1 mg GnRH-PAP kg(-1) as one bolus injection daily for three consecutive days. One dog received a single bolus (0.1 mg x kg(-1)). Three adult male dogs received GnRH without the PAP conjugate, as controls. Twenty-five weeks after the initial treatment, all treated dogs received 0.1 mg GnRH-PAP kg(-1) as a single administration, whereas dogs in the control group received 0.0045 mg kg(-1) of the GnRH analogue. Serum concentrations of testosterone and LH were determined by radioimmunoassay, and testis size was measured for 9 months after treatment. Stimulation tests (5 microg GnRH kg(-1)) were used to evaluate LH release (-15, 0, 30, 60, 90, 120 min), which was assessed by measuring area under the curve. Serum testosterone concentrations were significantly lower ($P < 0.05$) after treatment in the bolus and hourly groups than in the control group. Testosterone concentrations fell to less than 50 pg x ml(-1) in three of four dogs in the bolus group and one of four dogs in the hourly group by week 8-9 after treatment. Basal LH was lower ($P < 0.05$) in the bolus and hourly groups than in the control group between weeks 0 and 33 after treatment. Treatment with GnRH-PAP reduced ($P < 0.05$) LH release after GnRH stimulation in the bolus and hourly groups compared with the control group. Testis volume was lower ($P < 0.05$) in all treated versus control dogs. In conclusion, administration of the conjugate GnRH-PAP at a 25 week interval resulted in a major disruption of reproductive parameters in male dogs; this effect was maintained for 11-12 weeks after a second injection of GnRH-PAP.

Descriptors: contraception, dogs, gonadorelin, GnRH analogue, testosterone, testis volume.

Saxena, B.B., A. Clavio, M. Singh, P. Rathnam, E.Y. Bukharovich, T.J. Reimers Jr, A. Saxena, and S. Perkins (2003). **Effect of immunization with bovine luteinizing hormone receptor on ovarian function in cats.** *American Journal of Veterinary Research* 64(3): 292-298. ISSN:

0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: OBJECTIVE: To determine the effect of immunization with bovine luteinizing hormone receptor (LH-R) on ovarian function of cats. ANIMALS: 9 adult female domestic cats. PROCEDURE: 7 cats were immunized with 0.5 mg of LH-R encapsulated in a silastic subdermal implant (3 x 10 mm); 2 served as control cats. Receptors had 80% specific binding to 125I-human chorionic gonadotropin with a binding capacity of 2,682 pM/mg. Cats received booster injections of LH-R. Cats were induced to ovulate with luteinizing hormone (LH) releasing hormone on day 345. Samples of venous blood and vaginal cells were collected through day 395. Observation of estrus behavior continued until day 516. Serum concentrations of estradiol, progesterone, thyroid gland hormones, LH, and LH-R antibody were determined. RESULTS: LH-R antibody was detected in the sera of immunized cats within 21 days after implantation. Detection of LH-R antibody was associated with suppression of serum progesterone to $< \text{or} = 0.5 \text{ ng/mL}$ during the study period, compared with concentrations of 5 to 10 ng/mL in control cats. Immunized cats did not display signs of estrus. Release of LH after administration of LH-releasing hormone indicated an intact hypothalamic-pituitary axis but poor corpus luteum function. Serum estradiol concentrations remained between 30 to 40 pg/mL in immunized and control cats. With the decrease antibody titers, hormone concentrations returned to a pattern consistent with that during fertility. CONCLUSIONS AND CLINICAL RELEVANCE: Active immunization with LH-R suppressed corpus luteum function in cats. The effect was reversible. An LH-R-based antifertility vaccine may have clinical application in other vertebrates.

Descriptors: cats, drug implants, estradiol, immunization, LH-R, physiology of ovulation, females.

Saxena, B.B., A. Clavio, M. Singh, P. Rathnam, Y. Bukharovich, T. Reimers Jr, A. Saxena, and S. Perkins (2002). **Modulation of ovarian function in female dogs immunized with bovine luteinizing hormone receptor.** *Reproduction in Domestic Animals* 37(1): 9-17. ISSN: 0936-6768.

NAL Call Number: SF105.A1Z3

Abstract: Adult female dogs were immunized with 0.5 mg bovine luteinizing hormone receptor (LH-R) encapsulated in a silastic subdermal implant and subsequently with four intramuscular booster injections of 0.1 mg LH-R each. Circulating LH-R antibody was detected in the sera 3 weeks post-implant. The appearance of LH-R antibody was associated with a decline in the serum progesterone concentrations to a range of 0-0.5 ng/ml until day 365 in the immunized dogs in comparison with a range of 5-10 ng in the control animals, suggesting a lack of ovulation and corpus luteum function in immunized dogs. The immunized dogs did not show signs of 'standing heat' and failed to ovulate when induced by LH-RH challenge. Serum oestradiol levels, however, remained in the range of 30-40 pg/ml in both the immunized and the control dogs. With the decline in the antibody titres, the hormonal profile and vaginal cytology returned to a fertile state and the dogs exhibited signs of 'standing heat', as well as vaginal bleeding. Dogs immunized with LH-R did not show any serious metabolic, local or systemic adverse effects. The hypothalamic--pituitary gonadal axis remained intact as indicated by little difference in pituitary LH levels between control and immunized animals, and by the release of LH by LH-RH challenge. These studies demon-

strate that active immunization of female dogs with LH-R could immunomodulate ovarian function to cause a reversible state of infertility. It may be postulated that, due to extensive interspecies homology, a recombinant LH receptor-based immunocontraceptive vaccine may also be effective in other vertebrates.

Descriptors: immunologic adjuvants, antibodies, corpus luteum, dogs, drug implants, estradiol, gonadorelin, immunization, luteinizing hormone, ovary, progesterone, LH receptors.

Shafik, A. (1994). **Prolactin injection, a new contraceptive method: experimental study.** *Contraception* 50(2): 191-199. ISSN: 0010-7824.

NAL Call Number: RG136.A1C6

Abstract: "Prolactin injection" is presented as a new contraceptive method. The method was tested in dogs. The dogs in the test group were injected with prolactin (PRL) in a dose of 600 micrograms/kg of body weight weekly for 6 months. During this period, the testicles, semen, reproductive hormones, renal function, and serum sodium and potassium were examined periodically. Testicular biopsy was obtained after 3 and 6 months of PRL injection. These investigations were repeated during the 6 months following withdrawal of the drug. Sperm count decreased to azoospermia in 3 months after PRL administration with decrease of sperm motility and increase of abnormal forms. Testicular biopsy showed degenerated seminiferous tubules. Reproductive hormones, renal function, and serum sodium and potassium revealed insignificant change ($P > 0.05$). Dog mating during the period of PRL administration induced no pregnancy. After 3 months of drug withdrawal, the sperm count normalized and dog mating produced pregnancy; offsprings showed no anomalies. The study demonstrates that PRL administration has the potential to be developed as a reversible male contraceptive.

Descriptors: reversible male contraception, intramuscular injection, dogs, prolactin (PRL), antispermatogenic agents, reduction in sperm count and motility.

Shigeta, M., A. Hasegawa, Y. Hamada, and K. Koyama (2000). **Analysis of B cell epitopes of a glycoprotein porcine zona pellucida (pZP1).** *Journal of Reproductive Immunology* 47(2): 159-168. ISSN: 0165-0378.

NAL Call Number: QR180.J64

Abstract: The zona pellucida (ZP) of mammalian oocytes forms an extracellular matrix composed of three major glycoproteins and plays an important role in sperm-zona interactions. As ZP had a strong organ-specific but species-cross-reactive antigenicity and passive or active immunization with ZP antigens could impair fertilization, the possibility of developing a immunocontraceptive vaccine has been extensively studied. Studies on active immunization with porcine ZP (pZP) that contain B cell epitopes and T cell epitopes demonstrated that a temporary infertility could be induced along with the elevation of antibody titers, but it was always associated with ovarian failure. This could be due to the oophoritis by activation of pathogenic T cell immunity. It is the general consideration that any adverse effects by vaccination should be avoided for an immunocontraception. From this point of view, the analysis of B cell epitopes of pZP protein would be helpful for construction of a safe immunocontraceptive vaccine with zona antigens. We determined the amino acid sequence of the B epitope in the pZP1 protein by using a monoclonal antibody (MAb-5H4) that possesses a fertilization blocking ability. In addition, antiserum raised to the epitope sequence was revealed to

block in vitro fertilization of homologous animal species.

Descriptors: amino acid sequence, monoclonal antibodies, B lymphocytes, molecular cloning, immunologic contraception, zona pellucida, membrane glycoproteins.

Shivers, C.A., P.M. Sieg, and H. Kitchen (1981). **Pregnancy prevention in the dog: potential for an immunological approach.** *Journal of the American Animal Hospital Association* 17(5): 823-828. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Descriptors: immune regulation of fertility, immunocontraception, dogs, prevention of pregnancy, porcine zona pellucida.

Skinner, S., S. Prasad, T. Ndolo, and B. Dunbar (1996). **Zona pellucida antigens: targets for contraceptive vaccines.** *American Journal of Reproductive Immunology* 35(3): 163-174. ISSN: 8755-8920.

NAL Call Number: QR180.A53

Descriptors: zona pellucida antigens, contraceptive vaccines, mammals, ovaries, follicular development.

Srivastava, N., R. Santhanam, P. Sheela, S. Mukund, S.S. Thakral, B.S. Malik, and S.K. Gupta (2002). **Evaluation of the immunocontraceptive potential of Escherichia coli-expressed recombinant dog ZP2 and ZP3 in a homologous animal model.** *Reproduction* 123(6): 847-887. ISSN: 1470-1626.

NAL Call Number: QP251.J75

Abstract: Dog zona pellucida glycoprotein 2 (dZP2), excluding the N-terminal signal sequence and the C-terminal transmembrane-like domain, was cloned and expressed as a polyhistidine fusion protein in *Escherichia coli* to evaluate the immunocontraceptive efficacy of ZP glycoproteins. The recombinant dZP2 (rec-dZP2) revealed a 70 kDa band corresponding to the full length transcript, as well as several low molecular mass fragments in western blot analysis. In addition to rec-dZP2, *E. coli* expressed recombinant dog ZP glycoprotein 3 (rec-dZP3), which has also been evaluated for its efficacy to block fertility in a homologous system. Three groups of female dogs (n = 4 per group) were immunized with rec-dZP2 conjugated to diphtheria toxoid (rec-dZP2-DT), rec-dZP3 conjugated to DT (rec-dZP3-DT) and DT alone. Immunization of female dogs with rec-dZP2-DT and rec-dZP3-DT led to generation of antibodies against the respective ZP proteins as well as to DT. Subsequent to mating, the four female dogs immunized with rec-dZP2-DT all conceived, which is indicative of failure of the anti-rec-dZP2 antibodies to block fertility. In the group of dogs immunized with rec-dZP3-DT, three of four animals did not conceive when mated with males of proven fertility. The block in fertility was associated with anti-dZP3 antibody titres. Ovarian histopathology revealed that the block in fertility in the group immunized with rec-dZP3-DT is probably manifested by inhibition in the development of follicles and is due to atretic changes in the zona pellucida. These results, although preliminary, indicate that immunization with dZP3 may be a feasible proposition to control dog populations provided that adequate antibody titres are achieved.

Descriptors: immunologic contraception, dog population control, zona pellucida, dZP2, *Escherichia coli*, membrane glycoproteins.

Talwar, G.P. and R.K. Naz (1981). **Immunological control of male fertility.** *Archives of Andrology* 7(2): 177-185. ISSN: 0148-5016.

NAL Call Number: QP253.A54

Abstract: A notable feature of the male gametes is the presence in them of proteins that are "foreign" to the immune system of both male and the female. It is there that are considered responsible for the elicitation of auto- and iso-antibodies in certain natural infertility cases. By virtue of their dual application in both sexes the sperm antigens have interesting potential for exploration as possible agents for control of fertility.

Descriptors: fertility control, immunologic contraception, BCG vaccine, dogs, male, oligospermia, drug effects on sperm motility, sperm antigens.

Thompson, D.L.Jr. (2000). **Immunization against GnRH in male species (comparative aspects).** *Animal Reproduction Science* 60/61: 459-469. ISSN: 0378-4320.

NAL Call Number: QP251.A5

Descriptors: GnRH, immunization, livestock, animal behavior, fertility, neutralization, odours, testes, male animals, reproduction, aggressive behavior, immunocastration.

Verdier, Y., N. Rouet, G. Farr, and F. Bou (2001). **Identification of antigenic fox spermatozoa surface proteins for use in a contraceptive vaccine.** *Journal of Andrology* (Supplement): 158. ISSN: 0196-3635.

Descriptors: immunocontraception, contraception method, immunologic method, contraceptive vaccine development, fertility control.

Notes: Meeting Information: VIIth International Congress of Andrology, Montreal, Canada, June 15-19, 2001.

Verhage, H.G., A.T. Fazleabas, P.A. Mavrogianis, M.B. O'Day-Bowman, A. Schmidt, E.B. Arias, and R.C. Jaffe (1997). **Characteristics of an oviductal glycoprotein and its potential role in fertility control.** *Journal of Reproduction and Fertility Supplement* 51: 217-226. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: At the time of ovulation the lining epithelium of the mammalian oviduct consists of columnar ciliated and secretory cells. These mature cells are dependent on ovarian steroids in carnivores. Oestradiol induces differentiation of these cells and maintains their mature functional state, and progesterone induces dedifferentiation. The secretory cells synthesize and secrete an oestrogen-dependent high molecular weight glycoprotein. The cDNAs encoding oviductal glycoproteins from several species have been sequenced and show high similarity. The human cDNA hybridized with a single message on northern blots of total oviduct RNA obtained from oestradiol-treated cats (about 2.3 kb) and dogs (about 2.1 kb). This glycoprotein is the major nonserum protein present in the oviductal lumen at the time of ovulation, fertilization and early embryonic development. The glycoproteins associate with the zona pellucida of oviductal eggs in all species studied to date. Recent studies suggest that the bovine glycoprotein facilitates sperm capacitation and significantly increases the ability of bovine spermatozoa to fertilize bovine oocytes in vitro, that the hamster glycoprotein increases the sperm penetration rate of the zona pellucida by three times and that the human glycoprotein increases sperm binding to the zona pellucida by three times. All of the evidence

for a biological function for this glycoprotein is derived from studies performed in several different species at reproductive stages before fertilization. The biological actions of this glycoprotein suggest a potential role for the glycoprotein in fertility control. Specifically, purified or recombinant glycoprotein may improve success in IVF procedures by enhancing binding of spermatozoa to the zona pellucida and improving fertilization rates. The glycoprotein may also be a potential immun contraceptive target since antibodies generated against the oviducal glycoprotein may prevent fertilization by preventing binding of spermatozoa to the zona pellucida.

Descriptors: fertility, glycoproteins, animals, species specificity, sperm-ovum interaction, zona pellucida, immun contraception.

Wango, E.O. and S. Gombe (1995). **The effect of immunising dogs against an androgen binding cauda epididymal antigen (caba)**. *Discovery and Innovation* 7(3): 265-281. ISSN: 1015-079X.

Descriptors: ammonium sulfate precipitation, antibody, fertility control, immun contraceptive vaccine, protein, testosterone, domestic and wild animals, epididymal proteins.

Zhu, X. and R.K. Naz (1999). **Comparison of ZP3 protein sequences among vertebrate species: to obtain a consensus sequence for immun contraception**. *Frontiers in Bioscience: A Journal and Virtual Library* 4: D212-D215. ISSN: 1093-4715.

Online: <http://www.bioscience.org/1999/v4/d/zhu/fulltext.htm>

Abstract: The deduced ZP3 amino acid (aa) sequences of 13 vertebrate species namely mouse, hamster, rabbit, pig, porcine, cow, dog, cat, human, bonnet, marmoset, carp, and frog were compared using the PILEUP and PRETTY alignment programs (GCG, Wisconsin, USA). The published aa sequences obtained from 13 vertebrate species indicated the overall evolutionarily conservation in the N-terminus, central region, and C-terminus of the ZP3 polypeptide. More variations of ZP3 polypeptide sequences were seen in the alignments of carp and frog from the 11 mammalian species making the leader sequence more prominent. The canonical furin proteolytic processing signal at the C-terminus was found in all the ZP3 polypeptide sequences except of carp and frog. In the central region, the ZP3 deduced aa sequences of all the 13 vertebrate species aligned well, and six relatively conserved sequences were found. There are 11 conserved cysteine residues in the central region across all species including carp and frog, indicating that these residues have longer evolutionary history. The ZP3 aa sequence similarities were examined using the GAP program (GCG). The highest aa similarities are observed between the members of the same order within the class mammalia, and also (95.4%) between pig (ungulata) and rabbit (lagomorpha). The deduced ZP3 aa sequences per se may not be enough to build a phylogenetic tree.

Descriptors: amino acid sequence, Callithrix, cats, cattle, consensus sequence, dogs, egg proteins, fishes, hamsters, human, *Macaca radiata*, membrane glycoproteins, mice, rabbits, cell surface receptors, swine, *Xenopus*, zona pellucida.

Complications Resulting from Sterilization/Contraception Techniques

Aiken, S.W., S. Jakovljevic, G.C. Lantz, and W.E. Blevins (1993). **Acquired arteriovenous fistula secondary to castration in a dog.** *Journal of the American Veterinary Medical Association* 202(6): 965-967. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: A 6-year-old castrated male Basset Hound was examined because of a 1-year history of a pulsating mass in the right inguinal region. The pulsatile mass was diagnosed as an arteriovenous fistula by physical examination and angiography. Surgical exploration revealed that the right testicular artery and vein, the artery of the ductus deferens, and the cremasteric artery were involved in the fistula. The fistula was believed to have developed secondary to castration performed at 6 months of age. The mass and associated vessels were completely excised and signs of recurrence were not observed 13 months after surgery.

Descriptors: dogs, castration, postoperative complications, fistula, arteries, hemorrhage, case studies.

Altarifi, A.R.H. (1982). **A study of surgical complications of ovariohysterectomy and pyometra in the bitch and cat.** *Index to Theses* 30(2): 281.

Descriptors: cat diseases, dog diseases, uterine diseases, ovariectomy, hysterectomy, pyometra, postoperative complications, cats, dogs.

Anonymous (2001). **When should bitches be neutered.** *The Veterinary Record* 148(16): 491-493. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: attitude of health personnel, dogs, ovariectomy, age factors, postoperative complications.

Arbeiter, K. (1986). **Harnblaseninkontinenz nach der ovariohysterektomie bei der hündin [Urinary bladder incontinence in the bitch after ovariohysterectomy].** *Kleintier-Praxis* 31(5): 215-222. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: dog diseases, surgery, estrogens, acupuncture, ovariectomy, bitches, urinary incontinence, hysterectomy, postoperative complications, dogs.

Language of Text: German.

Arnbjerg, J., S. Knold, and N.I. Heje (1992). **Die vorbereitung des operationsfeldes zur kastration von katern [Preparation of the feline scrotum for castration - the need to avoid hair plucking].** *Kleintier-Praxis* 37(8): 535-538. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: complications, techniques, surgical operations, castration, cats.

Language of Text: German; Summary in English and French.

Arnold, S. (1997). **Harninkontinenz bei kastrierten Hundinnen. Teil 1: Bedeutung, Klinik und Aetiopathogenese [Urinary incontinence in castrated bitches. Part 1: Significance, clinical aspects and etiopathogenesis]**. *Schweizer Archiv Fur Tierheilkunde* 139(6): 271-276. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Abstract: Acquired urinary incontinence occurs in 20% of spayed dogs and there exists a strong correlation between body weight and the risk of urinary incontinence. Bitches with a body weight of more than 20 kg have a risk of 30% while smaller dogs have a risk of 10%. A particular breed disposition exists in Boxers in which 65% are affected. Other breeds with a more than average disposition for urinary incontinence are Dobermans and Giant Schnauzers. Urinary incontinence due to spaying manifests itself mainly while the dogs are sleeping. The cause is a urethral sphincter incompetence which can be verified by a urethral pressure profile (UPP). The microtransducer method proved to be a suitable method for urodynamic studies. It could be demonstrated that the urethral closure pressure is significantly lower in incontinent bitches (4.6 +/- 2.3 cm H₂O) than in continent bitches (18.6 +/- 10.5 cm H₂O). In addition, the urethral closure pressure for continent bitches dropped significantly within 12 months after surgery. Histological examination revealed that the functional urethral closure cannot be explained by the extent of discernible structures of the urethral wall as seen by light microscopy.

Descriptors: animals, body weight, breeding, dog diseases, dogs, female, hysterectomy, adverse effects of ovariectomy, risk factors, urinary incontinence.

Language of Text: German; Summary in English.

Arnold, S. (1997). **Harninkontinenz bei kastrierten hundinnen. Teil 2: diagnose und behandlung [Urinary incontinence in spayed bitches. Part 2: diagnosis and treatment]**. *Schweizer Archiv Fuer Tierheilkunde* 139(7): 319-324. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Abstract: Urinary incontinence due to spaying is caused by a sphincter incompetence of the urethra. In practice the diagnosis is established by ruling out other causes of incontinence such as neurological disease, bacterial cystitis, urinary tract malformation, iatrogenic ureterovaginal fistula and neoplasia of the urinary tract. An accurate diagnosis of urethral sphincter incompetence is made by urethral pressure profilometry. A urethral closure pressure of 7.4 cm H₂O allowed the differentiation of bitches with urinary incontinence, due to spaying, from healthy control dogs with a diagnostic accuracy of 91%. For therapy alpha-adrenergic drugs (Ephedrine or Phenylpropanolamine) are recommended, which result in continence in 74% and improvement in 24% of incontinent patients. In the absence of response estrogens may be used. If the medical therapy fails to achieve urinary continence, the endoscopic injection of collagen into the submucosa of the proximal urethra can be performed. This is a simple and minimally invasive procedure. It rarely leads to complications and may be repeated when necessary. The method is successful in 75% of cases.

Descriptors: urinary system, alpha adrenergic agent, bitches, complications, endoscopic col-

lagen injection, ephedrine, phenylpropanolamine, spaying, sterilization method, therapeutic method, urinary incontinence.

Language of Text: German; Summary in English.

Arnold, S. (1997). *Harninkontinenz bei kastrierten Hundinnen [Urinary incontinence in spayed bitches]*. Dissertation, Universitat Zurich: Stuttgart, Germany. 103 p.

Online: ISBN 3432298315

NAL Call Number: SF992.U75A76--1997

Descriptors: surgical operations, complications, bitches, urinary incontinence, dogs, spaying.

Language of Text : German.

Arnold, S., P. Arnold, M. Hubler, M. Casal, and P. Rusch (1989). **Incontinentia urinae bei der kastrierten hundin: haufigkeit und rassedisposition [Urinary incontinence in spayed bitches: frequency and breed predisposition]**. *Schweizer Archiv Fur Tierheilkunde* 131(5): 259-263. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Abstract: A follow up study was performed in 412 spayed bitches in order to determine the incidence of urinary incontinence. The period between the operation being performed and the survey being made varied between 3 and 10 years. 83 animals (20.1%) were incontinent independent of the surgical procedure (ovariectomy versus ovariohysterectomy). The onset of incontinence varied between immediately to 12 years with an average period of 2.9 years after surgery. 57 of these incontinent bitches were treated with ephedrine or estrogen. In 73.7% a good response was achieved with ephedrine and a further 23.7% showed some improvement. Generally ephedrine was more successful than estrogen in the treatment of incontinence. There appears to be a strong connection between body weight and the incidence of incontinence. Of bitches with a body weight of less than 20 kg only 9.3% were incontinent. Whereas in bitches with a body weight of more than 20 kg the incidence was 30.9%. Of the breeds Boxers showed a high incidence of incontinence (65%) while breeds such as German Shepherds (10.6%) or Dachshunds (11.1%) showed a low incidence in relation to the average incidence rate (20.1%).

Descriptors: surgical operations, predisposition, ovariectomy, bitches, postoperative complications, urinary incontinence, dogs.

Language of Text: German; Summary in English, French and Italian.

Arnold, S., M. Hubler, M. Casal, G. Lott Stolz, B. Hauser, and P. Rusch (1992). **The transplantation of autologous ovarian tissue in the bitch for the prevention of side effects due to spaying. A retrospective study several years after surgery.** *The European Journal of Companion Animal Practice* 3(1): 67-71.

NAL Call Number: SF981.E8

Descriptors: ovariectomy, urinary incontinence, postoperative complications, surgery, dogs.

Arnold, S., M. Hubler, M. Casal, G. Lott Stolz, B. Hauser, and P. Rusch (1988). **Transplantation von autologem Ovargewebe zur Verhinderung von unerwünschten Kastrationsfolgen bei der Hundin (Überprüfung von Patienten mehrere Jahre nach der Operation) [Trans-**

plantation of autologous ovarian tissue to prevent side effects of spaying in bitches (survey of cases several years after the operation)]. *Schweizer Archiv Fur Tierheilkunde* 130(7): 369-379. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Descriptors: allografts, ovaries, transplantation, complications, dogs.

Language of Text: German; Summary in English, French and Italian.

Bagley, R.S., S.A. Dougherty, and J.F. Randolph (1994). **Tetanus subsequent to ovariohysterectomy in a dog.** *Progress in Veterinary Neurology* 5(2): 63-65. ISSN: 1061-575X.

NAL Call Number: SF895.P76

Descriptors: bitches, ovariectomy, hysterectomy, postoperative complications, tetanus, uterus, *Clostridium tetani*, case reports.

Banks, S.E., I.R. Fleming, and T.N. Browning (1991). **Urinary incontinence in a bitch caused by vaginoureteral fistulation.** *The Veterinary Record* 128(5): 108. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: dog diseases, fistula, urinary incontinence dogs, fistula complications, hysterectomy, ovariectomy.

Bellah, J.R., C.P. Spencer, and K.R. Salmeri (1989). **Hemiprostic urethral avulsion during cryptorchid orchiectomy in a dog.** *Journal of the American Animal Hospital Association* 25(5): 553-556. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Descriptors: postoperative complications, urethra, dog diseases, surgery, case reports, cryptorchidism, dogs.

Bellenger, C.R. and T.L.W. Rothwell (1991). **Sclerosing encapsulating peritonitis in a dog.** *Australian Veterinary Practitioner* 21(3): 131-132, 134. ISSN: 0310-138X.

Descriptors: case report, pathology, therapy, postoperative complications, peritonitis, dogs, abdominal distension, ovariohysterectomy.

Berchtold, M. and K. Wissler (1982). **Trachtigkeit und Geburt bei einer ovarektomierten Katzin [Pregnancy and parturition in an ovariectomized cat].** *Schweizer Archiv Fur Tierheilkunde* 124(3): 157-159. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Descriptors: ovariectomy, postoperative complications, parturition complications, cats.

Language of Text: German; Summary in English, French and Italian.

Berchtold, M. and S. Zindel Grunder (1981). **Viszerale Transplantation von Ovargewebe zur Verhinderung von Nebenwirkungen nach der Kastration der Hundin [Visceral transplantation of ovarian tissue for inhibition of side-effects after castration of the bitch].** *Zuchthygiene* 16(2): 80. ISBN.

NAL Call Number: SF105.A1Z8

Abstract: From the 6th Joint Symposium of German Veterinary Society (Group on Reproduction and its Disorders), German Society for Animal Production (Sanitation Section),

German Society for the Study of Fertility and Sterility, and Austrian Society for the Study of Fertility and Sterility on the Subject of Physiology of Reproduction, Berlin, West Germany, March 25-26, 1981.

Descriptors: ovaries, bitches, ovariectomy, postoperative complications, dogs.

Berzon, J.L. (1979). **Complications of elective ovariohysterectomies in the dog and cat at a teaching institution: clinical review of 853 cases.** *Veterinary Surgery* 8(3): 89-91. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Descriptors: intraoperative and postoperative complications, students, elective surgery, ovariohysterectomy.

Bird, K.E., W.P. Farrar, and M.S. Whitney (1996). **What is your diagnosis? [Foreign body granuloma caused by a retained sponge following spay surgery in a dog].** *Veterinary Clinical Pathology* 25(3): 90,99. ISSN: 0275-6382.

Descriptors: surgery, postoperative complications, case reports, abdominal cavity, ovariectomy, foreign bodies, granuloma, dogs.

Blendinger, C., K. Blendinger, and H. Bostedt (1995). **Die Harninkontinenz nach Kastration bei der Hundin. 1. Mitteilung: Entstehung, Haufigkeit und Disposition [Urinary incontinence following ovariectomy in bitches. I. Origin, frequency and predisposition].** *Tierärztliche Praxis* 23(3): 291-299. ISSN: 0303-6286.

NAL Call Number: SF603.V4

Descriptors: ovariectomy, complications, urinary incontinence, surgery, dogs.

Language of Text: German; Summary in English.

Blendinger, C., K. Blendinger, and H. Bostedt (1995). **Die Harninkontinenz nach Kastration bei der Hundin. 2. Mitteilung: Therapie [Urinary incontinence in castrated female dogs. 2. Therapy].** *Tierärztliche Praxis* 23(4): 402-406. ISSN: 0303-6286.

NAL Call Number: SF603.V4

Abstract: Several methods can be used for the treatment of urinary incontinence due to urethral sphincter incompetence in spayed bitches. The most commonly applied medicaments are either alpha-sympathomimetics or estrogens. Because of their high effectiveness and little side effects alpha-sympathomimetics should be preferred. A clinical field trial showed that ephedrine and phenylpropanolamine are highly efficient (ephedrine 93%, phenylpropanolamine 97%) and had very little side effects. It has proved to be valuable to apply 1.2-1.7 mg/kg/day (ephedrine) respectively 1.5 mg/kg twice a day (phenylpropanolamine) as an initial dosage and to reduce this step by step to the lowest dosage that keeps the dog continent. When urinary incontinence does not respond to conservative treatment several surgical techniques can be performed.

Descriptors: dogs, ephedrine, estrogens, ovariectomy, therapeutic use of phenylpropanolamine, urinary incontinence, urethra, alpha-sympathomimetics.

Language of Text: German.

Bonsack, F.A. (2001). **Does not believe there is an ovarian remnant syndrome.** *Journal of the American Veterinary Medical Association* 219(12): 1675-6. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, hysterectomy, ovariectomy, postoperative complications, laparotomy, veterinary surgery.

Cabannes, A., F. Lucchese, H. Pelse, N. Biesel, M. Eymonnot, and M. Appriou (2000). **Castration and feline Borreliosis in Gironde.** *Revue De Medecine Veterinaire* 151(10): 949-954. ISSN: 0035-1555.

NAL Call Number: 41.8 R32

Descriptors: antibodies, castration, epidemiology, males, females, borreliosis.

Campbell, V.L., K.J. Drobatz, and S.Z. Perkowski (2003). **Postoperative hypoxemia and hypercarbia in healthy dogs undergoing routine ovariohysterectomy or castration and receiving butorphanol or hydromorphone for analgesia.** *Journal of the American Veterinary Medical Association* 222(3): 330-336. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine frequency and severity of postanesthetic hypoxemia and hypercarbia in healthy dogs undergoing elective ovariohysterectomy or castration and given butorphanol or hydromorphone for analgesia. DESIGN: Prospective trial. ANIMALS: 0 healthy dogs weighing > 10 kg (22 lb). PROCEDURE: Dogs were anesthetized with acepromazine, glycopyrrolate, thiopental, and isoflurane, and butorphanol (n = 10) or hydromorphone (10) was used for perioperative analgesia. Arterial blood gas analyses were performed 10 and 30 minutes and 1, 2, 3, and 4 hours after extubation. RESULTS: In dogs that received hydromorphone, mean PaCO₂ was significantly higher, compared with the preoperative value, 10 and 30 minutes and 1, 2, and 3 hours after extubation. Mean PaCO₂ was significantly higher in dogs given hydromorphone rather than butorphanol 10 and 30 minutes and 1 and 2 hours after extubation. Mean PaO₂ was significantly lower, compared with preoperative values, 30 minutes and 1 and 2 hours after extubation in dogs given hydromorphone and 30 minutes after extubation in dogs given butorphanol. Mean PaO₂ was significantly lower in dogs given hydromorphone rather than butorphanol 1 hour after extubation. Four dogs had PaO₂ < 80 mm Hg 1 or more times after extubation. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggest that administration of hydromorphone to healthy dogs undergoing elective ovariohysterectomy or castration may result in transient increases in PaCO₂ postoperatively and that administration of hydromorphone or butorphanol may result in transient decreases in PaO₂. However, increases in PaCO₂ and decreases in PaO₂ were mild, and mean PaCO₂ and PaO₂ remained within reference limits.

Descriptors: analgesics, anoxemia, butorphanol, hydromorphone, hypercapnia, postoperative complications, blood gas analysis, dogs, hysterectomy, orchiectomy, ovariectomy, adverse effects.

Cooley, D.M., B.C. Beranek, D.L. Schlittler, N.W. Glickman, L.T. Glickman, and D.J. Waters (2002). **Endogenous gonadal hormone exposure and bone sarcoma risk.** *Cancer Epidemiology Biomarkers and Prevention* 11(11): 1434-1440. ISSN: 1055-9965.

Descriptors: endocrine system, tumor biology, bone sarcoma, bone disease, neoplastic disease, age at gonadectomy, bone sarcoma development.

Coolman, B., S. Marretta, M. Dudley, and S. Averill (1999). **Partial colonic obstruction following ovariohysterectomy: a report of three cases.** *Journal of the American Animal Hospital Association* 35(2): 169-172. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Abstract: Partial extramural obstruction of the descending colon was diagnosed in two dogs and a cat as a complication of elective ovariohysterectomy. In each case, the obstruction was caused by fibrous tissue that encircled or crossed the descending colon, severely restricting the organ's normal mobility and luminal diameter. Clinical signs secondary to obstipation were observed in two cases, five weeks and 27 months after elective ovariohysterectomy. In one dog without clinical signs, the adhesion was an incidental finding during a laparotomy performed nine years after the ovariohysterectomy. The fibrous adhesions were removed surgically in all three cases without additional complications.

Descriptors: dog, cat, elective ovariohysterectomy, complications, fibrous band, colonic obstruction, obstipation, removal of fibrous adhesions.

Costa, F.S., D.M. Aguiar de, R. Giuffrida, M.R. Farias de, R. Torres Neto, D.M. de Aguiar, and M.R. de Farias (2002). **Tetano em um gato [Tetanus in a cat].** *Brazilian Journal of Veterinary Research and Animal Science* 39(3): 160-162. ISSN: 1413-9596.

Online: http://www.scielo.br/scielo.php?script=sci_abstract&pid=S1413-95962002000300010&lng=en&nrm=iso&tlng=en

Descriptors: bacterial toxins, case reports, epidemiology, neurotoxins, pathogenesis, tetanus, cats, orchietomy complications.

Language of Text: Portuguese; Summary in English.

Czerniak, A., C. Pelz Czerniak, P. Szabo, and A. Wahle (1992). **Verklebung im Abdominalbereich nach Laparotomien (Kastration) bei gesunden Hunden und ihre Folgen [Abdominal adhesions in three bitches after ovariectomy and their consequences].** *Praktische Tierarzt* 73(10): 968-969. ISSN: 0032-681X.

Descriptors: case reports, ovariectomy, bitches, postoperative complications, adhesions, dogs.

Language of Text: German; Summary in English.

David, G. and E.I. Rajendran (1980). **The after-effects of spaying in bitches and cats.** *Cheiron* 9(3): 193-195. ISSN: 0379-542X.

NAL Call Number: SF604.C56

Descriptors: urinary incontinence, obesity, ovariectomy, postoperative complications.

Davies, N.L. (1989). **Complications of ovarian autotransplantation in bitches.** *Journal of the South African Veterinary Association* 60(3): 145. ISSN: 0301-0732.

NAL Call Number: 41.8 So8_

Descriptors: dogs, postoperative complications, neoplasms, ovaries, ovariectomy.

Day, D.G., M.Q. Bailey, K.L. Evans, D.D. Smeak, and S.P. DiBartola (1993). **Postoperative evaluation of renal function after surgical correction of a ureterovaginal fistula in a cat.** *Journal of the American Veterinary Medical Association* 202(1): 104-106. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, ovariectomy, hysterectomy, fistulation, surgical operations, urination disorders, case studies, carnivora, disorders, felidae, functional disorders, gonadectomy, mammals, sterilization, surgical operations, postoperative complications, urinary incontinence.

de Baerdemaeker, G.C. (1984). **Post spaying vaginal discharge in a bitch caused by acquired vaginoureteral fistula.** *The Veterinary Record* 115(3): 62. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: dogs, hysterectomy, female genital diseases, fistulation, animals, genital diseases, injurious factors, urovagina, complications, surgical factors.

Demetriou, J.L. and E.M. Welsh (2000). **Colonic obstruction in an adult cat following open castration.** *The Veterinary Record* 147(6): 165-166. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: complications, cats, gut-tie, colonic stricture, fibrous ring, dorsal cystotomy, faecal tenesmus, spermatic cord, ligation of spermatic vasculature, inflammation.

Dhaliwal, G.K. (1990). **Postoperative complications in ovariohysterectomized dogs and cats.** *Jurnal Veterinar Malaysia* 2(2): 158. ISSN: 9128-2506.

Descriptors: surgery, suture techniques, ovariectomy, hysterectomy, postoperative complications, dogs, cats.

Dorn, A.S. and R.A. Swist (1977). **Complications of canine ovariohysterectomy.** *Journal of the American Animal Hospital Association* 13(6): 720-724. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Descriptors: breeds, age, techniques, bitches, ovariectomy, hysterectomy, postoperative complications, surgery.

Douglas, I.H. and R.H. Wrigley (1979). **What is your diagnosis? [Femur fracture in a cat after castration].** *Australian Veterinary Practitioner* 9(2). ISSN: 0310-138X.

Descriptors: case reports, radiography, fractures, femur, postoperative complications, gonadectomy.

Dubey, J.P., J. Benson, and M.A. Larson (2003). **Clinical *Sarcocystis neurona* encephalomyelitis in a domestic cat following routine surgery.** *Veterinary Parasitology* 112(4): 261-267. ISSN: 0304-4017.

NAL Call Number: SF810.V4

Descriptors: nervous system, parasitology, parasitic disease, routine castration surgery, cats.

Engels, J., N. Albrecht, D. Hagenbeck, and B. Struckmann (1995). **Tetanus beim hund [Tetanus in a dog].** *Kleintier-Praxis* 40(9): 707-708, 713-715. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: tetanus, case reports, therapy, antibiotics, immune serum, postoperative complications, dogs, *Clostridium tetani*.

Ewers, R.S. and P.E. Holt (1992). **Urological complications following ovariohysterectomy in a bitch.** *The Journal of Small Animal Practice* 33(5): 236-238. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: dogs, dystocia, pathology, diagnosis, bladder, hysterectomy, animal morphology, canidae, carnivora, disorders, functional disorders, mammals, parturition complications, reproductive disorders, surgical operations, urinary tract, urogenital system, ovariohysterectomy, postoperative complications.

Fehr, M. (1989). **Fadenfisteln aufgrund persistierender Kastrationsligaturen bei der Hundin [Suture fistula from persistent ovariohysterectomy ligature in bitches].** *Kleintier-Praxis* 34(3): 103-107. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: sutures, fistula, hysterectomy, postoperative complications, dogs.

Language of Text: German; Summary in English and French.

Flynn, M.F., E.M. Hardie, and P.J. Armstrong (1992). **Effect of ovariohysterectomy on maintenance energy requirement (MER) in cats: a dietary balance study.** *Veterinary Surgery* 21(5): 388. ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: From the 27th Annual Meeting, American College of Veterinary Surgeons, November 1992, Miami, Florida.

Descriptors: obesity, postoperative complications, diets, ovariectomy, hysterectomy, nutrient requirements, surgery, cats.

Furneaux, R., B. Baysen, and K. Mero (1973). **Complications of ovariohysterectomies.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 14(4): 98-99. ISSN: 0008-5286 .

NAL Call Number: 41.8 R3224

Descriptors: adhesions, castration, cats, dogs, female, hysterectomy, postoperative complications, case reports.

Gajentaan, J.E. (1982). **Gastric dilatation after ovariohysterectomy in a dog.** *Veterinary Medicine: Small Animal Clinician* 77(4): 608, 610. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: hysterectomy, ovariectomy, postoperative complications, dogs.

Galatos, A.D., T. Rallis, and D. Raptopoulos (1994). **Post anaesthetic oesophageal stricture formation in three cats.** *The Journal of Small Animal Practice* 35(12): 638-642. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: cat diseases, anaesthesia, case reports, pathology, diagnosis, therapy, oesophageal diseases, stenosis, postoperative complications, cats, ovariohysterectomy.

Ganssbauer, B., S. Kramer, A. Meyer Lindenberg, and I. Nolte (2000). **Tetanus nach ovariohysterektomie bei einem hund [Tetanus following ovariohysterectomy in a dog]**. *Tierärztliche Praxis* 28(4): 225-229. ISSN: 1434-1239.

NAL Call Number: SF603.V433

Descriptors: case reports, diagnosis, pathogenesis, treatment, postoperative complications, clinical aspects, castration, ovariectomy, dogs, *Clostridium tetani*.

Gokce, A.P., O. Besalti, A. Ozak, and S. Tong (1999). **Flank fistulae in ovariohysterectomized dogs and cats [Ovariohisterektomi yapılan kopek ve kedilerde flank fistulleri: 13 olgu (1996-1998)]**. *Veteriner Cerrahi Dergisi* 5(3-4): 5-8. ISSN: 1300-7106.

Descriptors: ovariectomy, hysterectomy, fistula, postoperative complications, surgery, cats, dogs.

Gregory, S.P., P.E. Holt, T.J. Parkinson, and C.M. Wathes (1999). **Vaginal position and length in the bitch: relationship to spaying and urinary incontinence**. *The Journal of Small Animal Practice* 40(4): 180-184. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: bitches, vagina, position, length, ovariectomy, urinary incontinence, pressure, bodyweight.

Guarneri Boe, M.A. and D. Lange (1995). **When to neuter: the controversy**. *Iowa State University Veterinarian* 57(1): 6-9. ISSN: 0099-5851.

Descriptors: kittens, surgery, age, anesthesia, postoperative complications, castration, cats.

Hadley, B.J., M.A. Berry, and M.A. Kaufmann (1970). **Effect on postoperative recovery rate and comfort of four approaches to nursing care of dogs: a pilot study**. *Communicating Nursing Research* 3: 121-137. ISSN: 0160-1652.

Descriptors: convalescence, nursing care, postoperative care, castration, dogs, hysterectomy, physical stimulation, pilot projects, postoperative complications prevention and control, preoperative care, time factors.

Hart, B.L. (2001). **Effect of gonadectomy on subsequent development of age-related cognitive impairment in dogs**. *Journal of the American Veterinary Medical Association* 219(1): 51-56. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine whether gonadectomy predisposes dogs to development of age-related behavioral changes linked to cognitive impairment. DESIGN: Cohort study. ANIMALS: 29 sexually intact male dogs, 63 spayed female dogs, and 47 castrated male dogs 11 to 14 years old. PROCEDURE: Information on possible impairments in 4 behavioral categories linked to cognitive impairment (orientation in the home and yard, social interactions, house training, and sleep-wake cycle) was obtained from owners of the dogs by use of a structured telephone interview format. A second interview was performed 12 to 18 months after the initial interview, and differences in responses were evaluated. RESULTS: Sexually intact male dogs were significantly less likely than neutered dogs to progress from mild impairment (i.e., impairment in 1 category) to severe impairment (i.e.,

impairment in > or = 2 categories) during the time between the first and second interviews. This difference was not attributable to differences in ages of the dogs, duration of follow-up, or the owners' perceptions of the dogs' overall health. **CONCLUSIONS AND CLINICAL RELEVANCE:** Results suggest that the presence of circulating testosterone in aging sexually intact male dogs may slow the progression of cognitive impairment, at least among dogs that already have signs of mild impairment. Estrogens would be expected to have a similar protective role in sexually intact female dogs; unfortunately, too few sexually intact female dogs were available for inclusion in the study to test this hypothesis. There may be a need to evaluate possible methods for counteracting the effects of loss of sex hormones in gonadectomized dogs.

Descriptors: gonadectomy, cognition disorders, dogs, estrogens, testosterone, age factors.

Hart, B.L. and L. Cooper (1984). **Factors relating to urine spraying and fighting in prepubertally gonadectomized cats.** *Journal of the American Veterinary Medical Association* 184(10): 1255-1258. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, castration, fighting, scent marking behavior.

Heider, H.J. (1990). **Kastration als therapeutische Massnahme? [Castration - therapeutic indications].** *Kleintier-Praxis* 35(12): 644-650. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: bitches, surgery, postoperative complications, small animal practice, castration, ovariectomy, neoplasms, dogs.

Language of Text: German; Summary in English and French.

Hermo, G., Y. Corrada, and C. Gobello (2003). **Incontinencia urinaria pos-castracion en la perra [Post spaying urinary incontinence in the bitch].** *Revista De Medicina Veterinaria Buenos Aires* 84(4): 185-187. ISSN: 0325-6391.

Descriptors: bitches, clinical aspects, diagnosis, ovariectomy, postoperative complications, surgery, surgical operations, therapy, urinary incontinence, dogs.

Hoenig, M., S. Alexander, S. Tolbert, and H. Pazak (2000). **Transient insulin resistance in cats after neutering.** *Journal of Veterinary Internal Medicine* 14(3): 377. ISSN: 0891-6640.

NAL Call Number: SF601.J65

Descriptors: metabolism, neutering, contraceptive method, transient insulin resistance.

Howe, L.M. (1997). **Short-term results and complications of prepubertal gonadectomy in cats and dogs.** *Journal of the American Veterinary Medical Association* 211(1): 57-62. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine short-term results and complications of prepubertal gonadectomy in cats and dogs. DESIGN: Prospective randomized study. ANIMALS: 775 cats and 1,213 dogs. PROCEDURE: Animals undergoing gonadectomy were allotted into 3 groups on the basis of estimated age (group 1, < 12 weeks old; group 2, 12 to 23 weeks old; group 3, > or = 24 weeks old). Complications during anesthesia, surgery, and the immediate

postoperative period (7 days) were recorded. Complications were classified as major (required treatment and resulted in an increase in morbidity or mortality) or minor (required little or no treatment and caused a minimal increase in morbidity). An ANOVA was used to detect differences among groups in age, weight, body temperature, and duration of surgery. To detect differences in complication rates among groups, chi 2 analysis was used. **RESULTS:** Group 1 consisted of 723 animals, group 2 consisted of 532, and group 3 consisted of 733. Group-3 animals had a significantly higher overall complication rate (10.8%) than group-1 animals (6.5%), but did not differ from group-2 animals (8.8%). Differences were not detected among the 3 groups regarding major complications (2.9, 3.2, and 3.0% for groups 1, 2, and 3, respectively), but group-3 animals had significantly more minor complications (7.8%) than group-1 animals (3.6%), but not group-2 animals (5.6%). **CLINICAL IMPLICATIONS:** In this study, prepubertal gonadectomy did not increase morbidity or mortality on a short-term basis, compared with gonadectomy performed on animals at the traditional age. These procedures may be performed safely in prepubertal animals, provided that appropriate attention is given to anesthetic and surgical techniques.

Descriptors: age factors, cats, dogs, adverse effects of hysterectomy, orchietomy, ovariectomy, population control, postoperative complications.

Janssens, L.A.A. and G.H.R.R. Janssens (1991). **Bilateral flank ovariectomy in the dog--surgical technique and sequelae in 72 animals.** *The Journal of Small Animal Practice* 32(5): 249-252. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: bitches, dogs, ovariectomy, sterilization, postoperative complications.

Jones, D.E. and J.O. Joshua (1982). *Reproductive Clinical Problems in the Dog*, Veterinary Practitioner Handbook, John Wright and Sons: Bristol, UK ISBN: 0723606382.

NAL Call Number: SF992.R4J65

Descriptors: reproductive physiology, pregnancy, parturition, oestrous cycle, reproductive disorders, parturition complications, bitches, female infertility, reproduction, dogs.

Kassem M.M., Nouh S.R., El Guindi M.H., Noseir M.B., and Abboud M.Y. (1985). **Studies on some modifications of ovariohysterectomy in bitches and its complication [Egypt].** *Assiut Veterinary Medical Journal* 15(29): 197-204. ISSN: 1012-5973.

Descriptors: postoperative complications, ovariectomy, hysterectomy, veterinary surgery, dogs.

Language of Text: English; Summary in Arabic.

Kumar, N., A. Kumar, and Bharat Singh (1990). **Clinical and physiological effects of ketamine with and without diazepam or meperidine premedication in dogs.** *Indian Veterinary Journal* 67(3): 242-246. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: anaesthetics, diazepam, pethidine, atropine, ketamine, dogs, veterinary surgeries, ovariohysterectomy.

- Kunin, S. and M. Terry (1980). **A complication following ovariohysterectomy in a dog.** *Veterinary Medicine: Small Animal Clinician* 75(6): 1000-1. ISSN: 0042-4889.
NAL Call Number: 41.8 M69
Descriptors: bladder diseases, castration, dog diseases, hysterectomy, postoperative complications, dogs.
- Kwapien, R.P., R.C. Giles, R.G. Geil, and H.W. Casey (1977). **Basaloid adenomas of the mammary gland in beagle dogs administered investigational contraceptive steroids.** *Journal of the National Cancer Institute* 59(3): 933-940. ISSN: 0027-8874.
NAL Call Number: 176.622 J82
Descriptors: adenomas, oral contraceptives, mammary tumors, light microscopy, progestins, estrogens, mestranol, dogs.
- Kwapien, R.P., R.C. Giles, R.G. Geil, and H.W. Casey (1980). **Malignant mammary tumors in beagle dogs dosed with investigational oral contraceptive steroids.** *Journal of the National Cancer Institute* 65(1): 137-144. ISSN: 0027-8874 .
NAL Call Number: 176.622 J82
Abstract: Of 172 beagle dogs administered investigational oral contraceptive steroids for 2.4-5.2 yr, 9 developed malignant mammary tumors. At necropsy their ages varied from 41-70 mo., with a mean age of 4.9 yr. The malignant tumors were observed in 1 dog that received ethynerone plus mestranol at 1.05 mg/kg per day and in 4 dogs that received chlorethynyl norgestrel plus menstrol at 1.05 mg/kg per day. Also, 4 dogs that received anagestone acetate plus menstrol at 0.44 or 1.10 mg/kg per day developed malignant mammary tumors. Malignant tumors were not seen in 33 dogs administered mestranol at 0.02 and 0.05 mg/kg per day for 7 yr or in 18 dogs given ethynerone without mestranol at 1.00 mg/kg per day for 5 yr. No malignant tumors were observed in 18 control dogs maintained for 7 yr without treatment. Three dogs had single malignant mammary nodules, 3 dogs had 2 malignant nodules, 2 dogs had 4-6 malignant nodules and 1 dog in the treatment group given high dosages of ethynerone plus mestranol had 14 mammary nodules composed of fibrosarcoma. The malignant tumors were histologically classified as 5 anaplastic carcinomas, 2 solid carcinomas, 1 tubular adenocarcinoma, 1 squamous cell carcinoma and 1 fibrosarcoma. Most dogs had only 1 histologic type of cancer (8/9 dogs); 1 dog had carcinomas of both solid and anaplastic types involving different glands. Metastases were present in 5 dogs and most often involved regional lymph nodes and lung.
Descriptors: adenocarcinoma, carcinogens, oral contraceptives, dogs, fibrosarcoma, lung neoplasms, mammary tumors, mestranol, norgestrel, norpregnadienes, pregnenes.
- Kyles, A.E., M. Aronsohn, E.A. Stone and A.J. Lipowitz (1996). **Urogenital surgery.** In: A.J. Lipowitz (editor), *Complications in Small Animal Surgery: Diagnosis, Management, Prevention*, Williams and Wilkins: Baltimore, MD, p. 455-525. ISBN: 0-683-05047-8.
Descriptors: urolithiasis, biopsy, ureter, kidney diseases, urethra, pyometra, cryptorchidism, urogenital system, postoperative complications, surgery, cats, dogs.

- Kyles, A., J. Douglass, and J. Rottman (1996). **Pyelonephritis following inadvertent excision of the ureter during ovariohysterectomy in a bitch.** *The Veterinary Record* 139(19): 471-472. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: bitches, ovariectomy, hysterectomy, complications, ureter, excision, pyelonephritis, case reports.
- Lamb, C.R. (1994). **Acquired ureterovaginal fistula secondary to ovariohysterectomy in a dog: diagnosis using ultrasound-guided nephropylacentesis and antegrade ureterography.** *Veterinary Radiology and Ultrasound* 35(3): 201-203. ISSN: 1058-8183.
NAL Call Number: SF757.8.A4
Descriptors: dogs, breeds animals, ovariectomy, surgical operations, case studies, diagnosis, ultrasonics, fistulation, canidae, carnivora, gonadectomy, mammals, radiations, sound, sterilization, surgical operations, taxa, terriers, postoperative complications.
- Lee, E.A. and B.R. Jones (1996). **Localised tetanus in two cats after ovariohysterectomy.** *New Zealand Veterinary Journal* 44(3): 105-108. ISSN: 0048-0169.
Descriptors: case reports, surgical operations, ovariectomy, diagnosis, treatment, drug therapy, postoperative complications, tetanus, hysterectomy, cats.
- Lekcharoensuk, C., C.A. Osborne, and J.P. Lulich (2001). **Epidemiologic study of risk factors for lower urinary tract diseases in cats.** *Journal of the American Veterinary Medical Association* 218(9): 1429-1435. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: cats, urinary tract diseases, risk factors, morbidity, epidemiology, breed differences, age differences, sex differences, gonadectomy.
- Liaw BorSong, Chi ChauHwu, Yeh LihSeng, B.S. Liaw, C.H. Chi, and L.S. Yeh (2003). **Case report: retrospective study of long-term complications after spay surgery in dogs and cats.** *Taiwan Veterinary Journal* 29(2): 156-161. ISSN: 1682-6485.
Descriptors: case reports, clinical aspects, ovariectomy, ovaries, postoperative care, postoperative complications, surgery, uterus, cats, dogs.
- Liu PanChen, Tung KwongChung, Shyu ChingLin, Chen YiPeng, P.C. Liu, K.C. Tung, C.L. Shyu, and Y.P. Chen (2000). **Case report: canine pyometra resulting from inadequate contraception surgery.** *Journal of the Chinese Society of Veterinary Science* 26(1): 78-83. ISSN: 0253-9179.
NAL Call Number: SF604.C54
Descriptors: pyometra, surgery, ovariectomy, postoperative complications, case reports, dogs.
- Lubberink, A.A., A.C. Okkens, G. Voorhout, and I. Van der Gaag (1981). **Ontstekingsprocessen, caudaal van de ribboog na ovario-hysterectomie bij de hond [Inflammatory lesions caudal to the costal arch following ovariohysterectomy in the bitch].** *Tijdschrift Voor Diergeneeskunde* 106(23): 1208-1214. ISSN: 0040-7453.
NAL Call Number: 41.8 T431

Abstract: Over a period of thirty months, twenty-two dogs showing inflammatory lesions caudal to the costal arch following ovariohysterectomy were submitted for examination. Seventeen patients showed fistulae, four showed painful swellings and one patient showed a fistula on one and a swelling on another side. After the findings on physical examination, the results of bacteriological haematological and radiological studies are reported. Surgical procedures consisted in laparotomy through the median line and/or local exploration of the region of the flanks, which led to laparotomy in some cases. The prognosis was bad in these cases; of eighteen patients with fistulae, only six, and of four patients showing swellings two recovered. The findings in six dogs submitted for post-mortem examination are reported.

Descriptors: ovariectomy, fistula, hysterectomy, postoperative complications, dogs.

Language of Text: Dutch; Summary in English.

MacCoy, D.M., G. Ogilvie, T. Burke, and A. Parker (1988). **Postovariohysterectomy ureterovaginal fistula in a dog.** *Journal of the American Animal Hospital Association* 24(4): 469-471. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Descriptors: dogs, case reports, ureter, vagina, hysterectomy, fistula, postoperative complications.

May, C. (1998). **Orthopaedic effects of prepubertal neutering in dogs.** *The Veterinary Record* 142(3): 71-72. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: radius, ulna, castration, surgery, dogs, prepubertal gonadectomy.

McEvoy, F.J. (1994). **Iatrogenic renal obstruction in a dog.** *The Veterinary Record* 135(19): 457-458. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: surgical operations, postoperative complications, hysterectomy, case reports, ureter, kidneys, obstruction, kidney diseases, dogs.

McLaughlin, M.A. (2002). **More thoughts on ovarian remnant syndrome.** *Journal of the American Veterinary Medical Association* 220(3): 295. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, cats, hysterectomy, ovariectomy, postoperative complications.

Mehl, M.L. and A.E. Kyles (2003). **Ureteroureterostomy after proximal ureteric injury during an ovariohysterectomy in a dog.** *The Veterinary Record* 153(15): 469-470. ISSN: 0042-4900.

Descriptors: dogs, female, adverse effects of hysterectomy and ovariectomy, ureter, ultrasonography.

Miller, D.M. (1995). **Ovarian remnant syndrome in dogs and cats: 46 cases (1988-1992).** *Journal of Veterinary Diagnostic Investigation* 7(4): 572-574. ISSN: 1040-6387.

NAL Call Number: SF774.J68

Descriptors: bitches, cats, queens, ovariectomy, hysterectomy, age, breeds, complications, histopathology, animal tissues.

- Millis, D.L., J.G. Hauptman, and M. Richter (1992). **Preoperative and postoperative hemostatic profiles of dogs undergoing ovariohysterectomy.** *Cornell Veterinarian* 82(4): 465-470. ISSN: 0010-8901.
Descriptors: dog diseases, surgical operations, postoperative complications, haematology, ovariectomy, hysterectomy.
- Modigh, A. **Post-operative complications of ovariohysterectomy in the bitch: Post-operativa komplikationer till ovariohysterectomi utfoerd vid pyometra hos hund. Foerdjupning-sarbete.** Uppsala (Sweden). Slu. 1996. 14 P.
Abstract: I HAVE NO IDEA WHERE THIS CAME FROM!
Descriptors: dogs, pyometra, hysterectomy, ovariectomy, functional disorders, canidae, carnivora, disorders, female genital diseases, genital diseases, gonadectomy, mammals, organic diseases, sterilization, surgical operations, uterine diseases.
- Mohammed, A., I. Igbokwe, and M.M. Musa (1993). **Observations on immediate post-surgical complications of ovariohysterectomy (spaying) in mongrel bitches.** *Bulletin of Animal Health and Production in Africa* 41(3): 229-231. ISSN: 0378-9721.
Descriptors: bitches, surgery, ovariectomy, hysterectomy, postoperative complications, dogs.
- Moormann, K., M. Sager, and J. Assheuer (2003). **Schmerzen im Bereich der Harnblase als Komplikation nach Ovariohysterektomie bei einer Hundin [Abdominal pain as a complication after ovario-hysterectomy in a bitch].** *Kleintier-Praxis* 48(3): 151-155. ISSN: 0023-2076.
NAL Call Number: 41.8 K67
Descriptors: bitches, case reports, clinical aspects, hysterectomy, ovaries, postoperative complications, surgery, surgical operations, dogs.
Language of Text: German; Summary in English.
- Muir, R., S. Goldsmid, and C. Bellenger (1991). **Megacolon in a cat following ovariohysterectomy.** *The Veterinary Record* 129: 512-513. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: adhesions, cats, constipation, female, hysterectomy, megacolon, ovariectomy, postoperative complications.
- Murphy, S.T., S.M. Newell, and C.F. Burrows (1998). **What is your diagnosis?** *Journal of the American Veterinary Medical Association* 212: 195-196. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: dogs, hysterectomy, suture techniques, postoperative complications.
- Musselman, E.E. and S.M. Hartsfield (1976). **Complete atrioventricular heart block due to hypokalemia following ovariohysterectomy.** *Veterinary Medicine: Small Animal Clinician* 71(2): 155-9. ISSN: 0042-4889.
NAL Call Number: 41.8 M69
Descriptors: castration, dogs, hypokalemia, hysterectomy, complications.

Neiger, R. and C.R. Lamb (2000). **Retrograde vaginographie zur diagnose einer ureterovaginalen fistel nach ovariohysterektomie: zwei faelle** [Uretrovaginal fistula as complication of a ovariohysterectomy: two cases]. *Schweizer Archiv Fuer Tierheilkunde* 142(9): 529-533. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Descriptors: ureterovaginal fistula, clinical pathology, female reproductive system disease, urologic disease, abdominal ultrasound, complications of ovariohysterectomy, case study.

Nelson, L.W., J.H. Weikel Jr., and F.E. Reno (1973). **Mammary nodules in dogs during four years' treatment with megestrol acetate or chlormadinone acetate.** *Journal of the National Cancer Institute* 51(4): 1303-11. ISSN: 0027-8874.

Abstract: A 7 year study of megestrol and chlormadinone in female dogs is in progress. This report characterized histopathologically 60 mammary nodules during the first 4 years of the study. 100 purebred female beagles, 6-12 months of age, were randomly assigned to 5 equal groups. One group was used as a control. Oral doses were .01, .10, and .25 mg/kg/day of megestrol acetate in coconut oil in capsules and of chlormadinone acetate .25 mg/kg/day in lactose tablets. These doses were 1, 10, and 25 times the projected dose of megestrol for humans and about 25 times the human dose of chlormadinone. After 2 years 4 dogs from each group were necropsied. One high-dose megestrol-treated and 1 chlormadinone-treated dog had benign mixed mammary tumors. Palpable nodules were first observed at 16 months in the chlormadinone-treated dogs, at 18 months in dogs given the high dose megestrol and at 27 months in the dogs treated with middle-dose megestrol. Transitory nodules were found in 4 control dogs after 21 months and in low dose megestrol-treated dogs at 26 months. Of 38 grossly detected nodules evaluated microscopically from the megestrol-treated dogs 27 were nodular hyperplasia, 5 were benign mixed mammary tumors, 3 were ductal dilatations, 1 was a lymph node, 1 was fat necrosis and 1 was the umbilicus. Of 22 nodules from the chlormadinone-treated dogs 12 were nodular hyperplasia, 4 benign mixed mammary tumors, 1 chondromucoid degeneration and 1 adenocarcinoma with widespread metastases. 3 nodules were lymph nodes and 1 other had no mammary tissue. Involutions, regression and sclerosis of many areas of nodular hyperplasia were evident at 4 years. Thus of the 60 nodules evaluated during the first 4 years of the study 50 were non-neoplastic and 10 were neoplastic. It is considered that the 1 adenocarcinoma may have been spontaneous and not a treatment-related neoplasm. A precursor stage through nodular hyperplasia apparently did not occur.

Descriptors: adenocarcinoma, chlormadinone, contraceptives, mammary glands, drug effects, megestrol, adenocarcinoma, chlormadinone acetate, dogs, hyperplasia.

Nickel, R.F. (1992). **Hoe vaak komt incontinentia urinae voor als complicatie na ovariohysterectomie bij de hond? [How often does urinary incontinence occur as a complication following ovario-hysterectomy in dogs?]** *Tijdschrift Voor Diergeneeskunde* 117(15-16): 464. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: dog diseases, hysterectomy, ovariectomy, urinary incontinence, dogs.

Language of Text: Dutch.

Okkens, A.C., S.J. Dieleman, and I. van der Gaag (1981). **Gynaecologische complicaties na ovariohysterectomie bij de hond ten gevolge van: 1. Het incompleet verwijderen van de ovaria. 2. Een ontsteking van de uterus-cervixsomp** [Gynaecological complications following ovariohysterectomy in dogs, due to partial removal of the ovaries or inflammation of the uterocervical stump]. *Tijdschrift Voor Diergeneeskunde* 106(22): 1142-1158. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Abstract: Of the total number of dogs with complications following ovario-hysterectomy submitted during the period from January 1977 to July 1979 (109), fifty-five showed gynaecological symptoms such as discharge of the vulva (28), attractiveness to male dogs (37), periods of heat (28) and pseudopregnancy (14). In addition to a general clinical examination, the dogs (forty-two of these fifty-five weighing more than 20 kg) underwent a selective gynaecological examination usually consisting in clinical, cytological and bacteriological studies and estimation of the progesterone level of the peripheral blood. At the same time, the progesterone levels of the peripheral blood of six beagles were studied for comparative purposes during pro-oestrus, oestrus and metoestrus; the maximum progesterone level was recorded about day 20 and varied from 35 to 60 ng/ml. The average progesterone level was determined in thirty-nine beagles during anoestrus and found to be 0.24 +/- 0.02 SEM ng/ml. The basal progesterone level was determined in eight dogs in which total ovariohysterectomy had been performed (0.14 +/- 0.02 SEM ng of progesterone /ml). When a cytological study was done in the dogs with residual ovarian tissue, an oestrus pattern was observed in 39 per cent of the cases, the progesterone level of the peripheral blood being above the basal level in 70 per cent of the cases. Remnants of ovarian tissue were removed during laparotomy in forty-seven dogs, on the right side in forty-one cases and on the left in twenty-two cases. The uterocervical stump was shortened when uterine tissue was probably or obviously present. The uterine stump was more or less severely inflamed in nineteen cases. The procedure was confined to shortening of the uterocervical stump in eight dogs in which ovarian tissue was not found to be present. The inflamed stump contained an unabsorbable ligature in seven dogs, the uterocervical stump of the eighth dog not being examined.

Descriptors: dogs, female, laparotomy, ovariectomy, hysterectomy, postoperative complications, veterinary surgery.

Language of Text: Dutch; Summary in English.

Okkens, A.C., H.S. Kooistra, and R.F. Nickel (1997). **Comparison of long-term effects of ovariectomy versus ovariohysterectomy in bitches.** in: *Reproduction in dogs, cats, and exotic carnivores proceedings of the Third International Symposium on Canine and Feline Reproduction, Veldhoven, The Netherlands*, Journal of Reproduction & Fertility: Cambridge, U.K., Vol. 51, p. 227-231. ISBN: 0906545315.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: Although ovariectomy is less invasive and less time-consuming than ovariohysterectomy, most surgical textbooks recommend ovariohysterectomy for routine neutering of bitches. This advice is probably based on concerns about the development of uterine disease after ovariectomy. However, there is no evidence that conditions such as cystic endometrial hyperplasia (CEH)-endometritis develop in the ovariectomized bitch, unless progestagens are administered. The purpose of this study was therefore to compare the long-term effects

of ovariectomy and ovariohysterectomy, including the incidence of urinary incontinence. Questionnaires were sent to 264 owners of bitches, in which ovariectomy (126) or ovariohysterectomy (138) had been performed as a routine neutering procedure 8-11 years earlier. Complete data were available for 69 bitches of the ovariectomy group and for 66 bitches from the ovariohysterectomy group. There were no indications that endometritis had developed in bitches of the ovariectomy group. None of the bitches was sexually attractive to male dogs after neutering. The occurrence of a clear to white vaginal discharge was reported in two bitches of each group, but none of these four bitches appeared to be ill during the periods when the discharge was present. Furthermore, with the exception of urinary incontinence, no problems were reported that could be related to the surgical neutering. Six of the ovariectomized bitches and nine of the ovariohysterectomized bitches eventually developed urinary incontinence. Of these 15 bitches (11%), 12 weighed more than 20 kg. Bouvier des Flandres bitches were at a higher risk of developing urinary incontinence than were those of the other breeds. The possibility that the urinary incontinence was due at least in part to other conditions must be considered, since eight of the bitches were 9 years or older before urinary incontinence occurred and seven of the incontinent bitches also had polyuria or polydipsia. There were no significant differences in the incidence of urogenital problems listed above between the bitches of the ovariectomy and ovariohysterectomy group. It is hypothesized that a uterine disease such as CEH-endometritis cannot develop after complete ovariectomy, unless progestagens are administered. The results of this study indicate that ovariectomy does not increase the risk of CEH-endometritis or other complications in comparison with ovariohysterectomy. It is concluded that there is no indication for removing the uterus during routine neutering in healthy bitches. On the contrary, ovariectomy should be considered the procedure of choice.

Descriptors: dogs, hysterectomy, ovariectomy, sterilization, reproductive, adverse effects of hysterectomy, time factors, treatment outcome, urinary incontinence.

Okkens, A.C., H.S. Kooistra, and R.F. Nickel (2003). **Comparison of long-term effects of ovariectomy versus ovariohysterectomy in bitches [Vergleich der Langzeiteffekte der Ovarektomie mit denen der Ovariohysterektomie bei der Hundin]**. *Praktische Tierarzt* 84(2): 98-101. ISSN: 0032-681X.

NAL Call Number: 41.8 P882

Descriptors: bitches, cystic endometrial endometritis, ovariectomy, postoperative complications, sterilization, surgery, surgical operations, surveys, urinary incontinence, dogs.

Okkens, A.C., H.S. Kooistra, and R.F. Nickel (2002). **Vergelijking van lange termijn effecten van ovariectomie versus ovariohysterectomie bij de teef [Comparison of long term side effects of ovariectomy versus ovariohysterectomy in the bitch]**. *Tijdschrift Voor Diergeneeskunde* 127(11): 369-372. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: comparative study, dogs, surgery, female, hysterectomy, ovariectomy, reproductive sterilization, time factors, urinary incontinence.

Language of Text: Dutch.

- Okkens, A.C., I. van der Gaag van der, W.J. Biewenga, J. Rothuizen, and G. Voorhout (1981). **Urologische complicaties na ovario-hysterectomie bij de hond [Urological complications following ovariohysterectomy in dogs]**. *Tijdschrift Voor Diergeneeskunde* 106(23): 1189-1198. ISSN: 0040-7453.
NAL Call Number: 41.8 T431
Descriptors: postoperative complications, urological problems, dogs, adhesions, granulomas, ligation of the ureters, kidney.
Language of Text: Dutch; Summary in English.
- Pearson, H. (1973). **The complications of ovariohysterectomy in the bitch.** *The Journal of Small Animal Practice* 14(5): 257-66. ISSN: 0022-4510.
NAL Call Number: 41.8 J8292
Descriptors: castration, dog diseases, hysterectomy veterinary, postoperative complications, castration adverse effects, dogs, estrus, hemorrhage, adverse effects of sutures.
- Perkins, N.R. and G.S. Frazer (1995). **Ovarian remnant syndrome in a toy poodle: a case report.** *Theriogenology* 44(3): 307-312. ISSN: 0093-691X.
NAL Call Number: QP251.A1T5
Abstract: Ovarian remnant syndrome (ORS) has been described in the dog and cat, and it appears to be a less frequent complication of routine ovariohysterectomy in the female dog and queen than in women. This has been attributed to the rare occurrence of pelvic inflammatory disease and of the associated adhesions in small animals, allowing the surgeon to recognize and remove the ovaries more easily in routine ovariohysterectomy. Animals with ORS present with a range of symptoms associated with endogenous hormone production by the remnant of ovarian tissue present in the abdomen. These include vulval swelling, proestral bleeding, estrous behavior and occasional mammary gland enlargement and milk production. The recommended treatment for ORS is surgical removal of remaining ovarian tissue. Histological examination of ovarian remnant tissue usually demonstrates the presence of corpora lutea or simple cystic structures. In a series of 72 females referred to the University of Bristol for complications arising after ovariohysterectomy, 12 (17%) were referred for continuing signs of estrus. No diagnostic tests were performed on these cases and functional ovarian tissue was found in all cases during exploratory laparotomy. A series of 11 cases of ORS in cats was reported recently by Wallace. The time interval from ovariohysterectomy to reported signs of estrus varied from 17 d to 9 yr. Hormonal challenge testing using GnRH was utilized in all eleven feline cases to demonstrate an elevation in serum progesterone concentration attributed to ovarian tissue. Signs of recurrent estrus resolved in all cases after surgical removal of ovarian tissue.
Descriptors: dogs, ovaries, estrus, diagnosis, case reports, estradiol, blood serum, progesterone, laparotomy, uterus, surgical operations.
- Plah, S. (1990). **Methods of spaying. [Correspondence]**. *The Veterinary Record* 127(21): 531. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: cats, ovariectomy, gonadectomy, sterilization, surgical operations, urogenital system, postoperative complications.

Pollari, F.L. and B.N. Bonnett (1996). **Evaluation of postoperative complications following elective surgeries of dogs and cats at private practices using computer records.** *The Canadian Veterinary Journal* 37(11): 672-678. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Abstract: This study was designed to determine the frequency of postoperative complications following elective surgeries (castration, ovariohysterectomy, onychectomy) of dogs and cats from private practices and to evaluate the use of electronic medical records for this type of research. All elective surgeries performed during the study period at 5 private practices were included. The surgical techniques and materials used for each procedure were similar across practices, but the interpretation of "complication," the amount of detail recorded on the primary medical record, and the intensity of follow-up varied. The frequencies and types of complications varied by species and procedure. The postoperative complication frequencies ranged from 1% to 24% for all complications and 1% to 4% for severe complications. The results of this study describe populations of elective-surgery patients at private practices, provide data for educating clients about the risks associated with these procedures, and demonstrate how computerized records can be used to collect practice-specific medical information.

Descriptors: cats, dogs, hysterectomy, orchietomy, ovariectomy, postoperative complications, prospective studies, veterinary records, software.

Pollari, F., B. Bonnett, S. Bamsey, A. Meek, and D. Allan (1996). **Postoperative complications of elective surgeries in dogs and cats determined by examining electronic and paper medical records.** *Journal of the American Veterinary Medical Association* 208(11): 1882-1886. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Postoperative complications (POC) that developed in dogs and cats that underwent elective ovariohysterectomy, castration, and declaw at a veterinary teaching hospital were determined by examining the computerized abstracts of the medical records and by examining a random sample of the paper medical records. When the computerized abstracts were examined, POC were found to have occurred in 62 (6.1%) of 1,016 dogs. One dog died and 6 others developed major complications. Postoperative complications were found to have occurred in 38 (2.6%) of 1,459 cats. Two cats died and 1 was euthanized. Four other cats developed major complications. Complete paper medical records for 218 dogs and cats were examined. When the paper medical records were examined, the proportions of dogs and cats with POC were 19.4% and 12.2%, respectively. These proportions were 4 to 7 times higher than when the computerized abstracts were the data source. Results of this study indicate that the frequency of clinically relevant POC of elective surgeries in dogs and cats is substantial. Examination of the computerized abstracts of medical records at this hospital allowed us to rapidly identify cases that could be included in the study but the frequency of POC would be significantly underestimated if paper records were not also assessed.

Descriptors: postoperative complications, dogs, cats, gonadectomy, castration, records.

Reichler, I.M., M. Hubler, W. Jochle, T.E. Trigg, C.A. Piche, and S. Arnold (2003). **The effect of GnRH analogs on urinary incontinence after ablation of the ovaries in dogs.** *Theriogenology* 60(7): 1207-1216. ISSN: 0093-691X.

Abstract: After removal of the ovaries approximately 20% of dogs develop urinary incontinence. Removal of the gonads results in estrogen deficiency and chronic elevation in the production and secretion of FSH and LH. The gonadotrophins may directly or indirectly, adversely affect the sphincter function of the urethra. Estrogen replacement therapy and treatment with sympathomimetics, such as ephedrine or phenylpropanolamine (PPA), are effective only in some of the affected dogs, and many of these subsequently become non-responsive. Since the role of the elevated gonadotrophins has not been elucidated, we used depot preparations of GnRH analogues to down-regulate gonadotrophins once or twice in 13 ovariectomized (ovx), incontinent dogs, which were either refractory to alpha-adrenergics (n=11) or in which alpha-adrenergics were contraindicated (n=2). Dogs were treated with leuprolide, deslorelin, buserelin or triptorelin. In 7 dogs treatments with GnRH analogues alone (n=11) resulted in continence for 50-738 days (mean 247). In all dogs except one, where GnRH treatments did not resolve the incontinence completely, additional treatment with phenylpropanolamine was successful. With additional treatment of phenylpropanolamine complete continence was restored for 21-367 days (mean 159). All treatments caused long-term reduction of circulating FSH and LH concentrations to very low or undetectable levels. No adverse effects of treatments were observed.

Descriptors: urinary incontinence, dogs, FSH, gonadorelin, leuprolide, LH, adverse effects of ovariectomy, phenylpropanolamine, sympathomimetics, triptorelin.

Remedios, A.M. and J.D. Fowler (1992). **Colonic stricture after ovariohysterectomy in two cats.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 33(5): 334-336. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: cats, ovariectomy, hysterectomy, postoperative complications, colon, case reports.

Romatowski, J. (1993). **Early-age neutering, an "uncontrolled experiment"**. *Journal of the American Veterinary Medical Association* 203(11): 1523. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: castration, cats, dogs, postoperative complications, age factors.

Rubin, S., R.T. Faulkner, and G.E. Ward (1983). **Tetanus following ovariohysterectomy in a dog: A case report and review.** *Journal of the American Animal Hospital Association* 19(3): 293-298. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Descriptors: tetanus, hysterectomy, dogs, *Clostridium bifermentans*, association, case reports.

Ruckstuhl, B. (1978). **Die Incontinentia urinae bei der Hundin als Spatfolge der Kastration [Urinary incontinence in the bitch as a sequel to spaying].** *Schweizer Archiv Fur Tierheilkunde* 120(3): 143-148. ISSN: 0036-7281.

NAL Call Number: 41.8 SCH9

Descriptors: adverse effects, breeds, estrogens, progestogens, urinary incontinence, bitches, ovariectomy, hysterectomy, postoperative complications, dogs.

Language of Text: German; Summary in English, French and Italian.

- Ryan, C.P. (1983). **Iatrogenic urolith in a dog [from steel sutures]**. *Veterinary Medicine: Small Animal Clinician* 78(7): 1073-1075. ISSN: 0042-4889.
NAL Call Number: 41.8 M69
Descriptors: sutures, radiography, dogs, ovariectomy, bladder calculi, postoperative complications.
- Salmeri, K.R. (2000). **Health effects of early-age neutering**. In: *Proceedings of the North American Veterinary Conference: Small Animal and Exotics Edition, Orlando, FL*, Eastern States Veterinary Association: Gainesville, FL, Vol. 14, p. 659-660.
NAL Call Number: SF605.N672
Descriptors: dogs, cats, gonadectomy, age, adverse effects, secondary sex characteristics, weight gain, skeletal growth, behavior, gonadal hormones, urethral function.
- Schaefers-Okkens, A.C. (1997). **Incontinentie na castratie op jonge leeftijd? [Incontinence after castration at an early age?]**. *Tijdschrift Voor Diergeneeskunde* 122(12): 343. ISSN: 0040-7453.
NAL Call Number: 41.8 T431
Descriptors: age factors, animals, dogs, female, sterilization, adverse effects of gonadectomy, urinary incontinence.
Language of Text: Dutch.
- Schaefers-Okkens, A.C. and H.S. Kooistra (1999). **Ovariectomen van een teef bij een leeftijd van acht maanden [Ovariectomy of a bitch at an age of eight months]**. *Tijdschrift Voor Diergeneeskunde* 124(8): 268-269. ISSN: 0040-7453.
NAL Call Number: 41.8 T431
Descriptors: age factors, animals, dog diseases, dogs, female, adverse effects of ovariectomy, urinary incontinence.
Language of Text: Dutch.
- Schaefers-Okkens, A.C. and H.S. Kooistra (2002). **Ovariectomie van de teef [Ovariectomy in the bitch]**. *Tijdschrift Voor Diergeneeskunde* 127(19): 590-591. ISSN: 0040-7453.
NAL Call Number: 41.8 T431
Descriptors: age factors, animals, dogs, estrus, female, adverse effects of ovariectomy.
Language of Text: Dutch.
- Schmidtke, D. and H.O. Schmidtke (1969). **Komplikationen nach Pyometra-Operationen [Complications following surgery for pyometra]**. *Berliner Und Muenchener Tieraerzliche Wochenschrift* 82(1): 10-13. ISSN: 0005-9366.
Descriptors: veterinary medicine, dogs, cats, postoperative complications, hysterectomy, surgical wound, suture techniques.
Language of Text: German.
- Schmidtke, H.O. and T. Meyer Engelke (1984). **Ureterenstauung und Hydronephrose nach unsachgemässer Kastration einer Hundin [Ureter obstruction and hydronephrosis after inexpert sterilization in a bitch]**. *Kleintier-Praxis* 29(3): 127. ISSN: 0023-2076.

NAL Call Number: 41.8 K67

Descriptors: ovariectomy, hysterectomy, postoperative complications, ureter, kidney diseases, surgery, dogs.

Language of Text: German.

Schulz, K.S., D.R. Waldron, M.M. Smith, R.A. Henderson, and L.M. Howe (1996). **Inadvertent prostatectomy as a complication of cryptorchidectomy in four dogs.** *Journal of the American Animal Hospital Association* 32(3): 211-214. ISSN: 0587-2871.

NAL Call Number: SF601.A5

Abstract: Inadvertent prostatectomy was identified as a complication of cryptorchidectomy in four dogs. Surgical correction of the resulting urethral trauma was attempted in each case. One case was euthanized due to a poor prognosis for recovery. Three cases survived without clinical evidence of urinary incontinence. Inadvertent prostatectomy during cryptorchidectomy may be avoided by adequate surgical exposure and proper identification of the abdominally retained testicle.

Descriptors: cryptorchidism, orchietomy, prostatectomy, adverse effects.

Notes: Comment In: J Am Anim Hosp Assoc. 1996 Sep-Oct;32(5):376-7.

Sjollema, B.E. (1993). **Katten na sterilisatie [Cats after sterilization].** *Tijdschrift Voor Diergeneeskunde* 118(21): 695-696. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: cats, ovariectomy, postoperative complications, ovariectomy, postoperative complications.

Language of Text: Dutch.

Skinner, C., L. Freeman, and S. Thompson (1988). **Gastroesophageal and enteroenteric intussusceptions following ovariohysterectomy in a dog with megaesophagus.** *California Veterinarian* 42(5): 7-9. ISSN: 0008-1612.

NAL Call Number: 41.8 C12

Descriptors: postoperative complications, regurgitation, stomach, intestines, oesophageal diseases, ovariectomy.

Smith, M. and N. Davies (1996). **Obstipation following ovariohysterectomy in a cat.** *The Veterinary Record* 138(7): 163. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: cats, ovariectomy, hysterectomy, postoperative complications, constipation, adhesions, case reports.

Stocklin-Gautschi N.M., Hassig M., Reichler I.M., and A.S. Hubler M. (2001). **The relationship of urinary incontinence to early spaying in bitches.** *Journal of Reproduction and Fertility* 57(Suppl.): 233-236. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: It is still controversial whether a bitch should be spayed before or after the first oestrus. It would be desirable to spay bitches at an age that would minimize the side effects of neutering. With regard to the risk of mammary tumours, early spaying must be recom-

mended because the incidence of tumours is reduced considerably. The aim of the present study was to determine whether early spaying also reduces the risk of urinary incontinence. The owners of 206 bitches that had been spayed before their first oestrus and for at least 3 years were questioned on the occurrence of urinary incontinence as a result of spaying. At the time of the enquiry the average age of the bitches was 6.5 years, and the average age at the time of surgery was 7.1 months. Urinary incontinence after spaying occurred in 9.7% of bitches. This incidence is approximately half that of spaying after the first oestrus. Urinary incontinence affected 12.5% of bitches that were of a large body weight (> 20 kg body weight) and 5.1% of bitches that were of a small body weight (< 20 kg body weight). The surgical procedure (ovariectomy versus ovari hysterectomy) had no influence on the incidence, or on the period between spaying and the occurrence of urinary incontinence. Urinary incontinence occurred on average at 2 years and 10 months after surgery and occurred each day, while the animals were awake or during sleep. However, compared with late spaying the clinical signs of urinary incontinence were more distinct after early spaying.

Descriptors: early spay-neuter, complications, mammary tumor development, urinary incontinence, ovariectomy, ovari hysterectomy.

Swalec, K.M. and D.D. Smeak (1989). **Priapism after castration in a cat.** *Journal of the American Veterinary Medical Association* 195(7): 963-964. ISSN: 0003-1488.

NAL Call Number: 41.8 AM3

Descriptors: cat, castration, adverse effects, penis, case studies, complications.

Teske E, Naan EC, Dijk EM van, Garderen E van, Schalken JA, van Dijk EM, van Dijk EM, and van Garderen E (2002). **Canine prostate carcinoma: epidemiological evidence of an increased risk in castrated dogs.** *Molecular and Cellular Endocrinology* 197(1-2): 251-255. ISSN: 0303-7207 .

NAL Call Number: QP187.A1M6

Descriptors: carcinoma, castration, diagnosis, epidemiology, hyperplasia, neoplasms, prostate, risk factors.

Thrusfield, M.V. (1985). **Association between urinary incontinence and spaying in bitches.** *The Veterinary Record* 116(26): 695. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: surgical operations, postoperative complications, urinary incontinence, ovariectomy, complications, dogs.

Thrusfield, M.V., P.E. Holt, and R.H. Muirhead (1998). **Acquired urinary incontinence in bitches: its incidence and relationship to neutering practices.** *The Journal of Small Animal Practice* 39(12): 559-566. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: bitches, urinary incontinence, incidence, ovariectomized females, risk factors, ovariectomy, estrous cycle, cervix.

Tomizawa, S., H. Ishikawa, and T. Matsui (1996). **Regeneration of ovarian tissue in ovario-hysterectomized cats with recurrent oestrus.** *Journal of the Japan Veterinary Medical Association* 49(11): 809-812. ISSN: 0446-6454.

Descriptors: regeneration, oestrus, ovaries, female genitalia, castration, postoperative complications, surgery, cats, dogs.

van der Gaag, I., R.P. Happe, A.C. Okkens, and W.T. Wolvekamp (1981). **Enterologische complicaties na ovario-hysterectomie bij de hond. [Enterological complications following ovariohysterectomy in the bitch].** *Tijdschrift Voor Diergeneeskunde* 106(23): 1199-1207. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Abstract: Of 109 dogs submitted with complications following ovariohysterectomy, twenty were found to show enterological problems. Presenting symptoms in these animals consisted in vomiting, diarrhoea and emaciation. A large number of animals also showed body temperatures above 39 degrees C. An irregular, often painful mass was palpable on examination of the mesogastrium in seventeen cases. Plain radiography revealed the features of ileus in ten dogs, a mass of soft tissues in the abdominal cavity in six and the pattern of peritonitis in five cases (two animals were classifiable with two groups). One dog did not show any changes. Laparotomy was performed in all twenty dogs. In view of the extent of the lesions, euthanasia was performed in ten animals. Partial enterectomy was performed in the other ten; some of these dogs are still alive at the time of writing. The findings at laparotomy and subsequent post-mortem examination, if any, may be summarized as follows: - there were adhesions between the ovarian-stump granulomas and an intestinal loop in five animals; - twelve animals showed adhesions between the ovarian-stump granuloma and the intestines which also adhered to each other; in five of these bitches, the intestinal loops were also attached to the wall of the abdomen, and also to the cervix stump in two cases; - three dogs only showed adhesions between intestinal loops; the cervix stump was involved in the adhesions in one dog.

Descriptors: castration, postoperative complications, adhesions, dogs, intestinal obstruction, peritonitis.

van Oosterom, R.A.A. (1986). **Therapie unerwünschter Kastrationsfolgen beim Hund. [Treating complications of castration in the dog].** *Der Praktische Tierarzt* 67(Sondernummer): 62-63. ISSN: 0032-681X.

NAL Call Number: 41.8 P882

Descriptors: urinary incontinence, surgical operations, therapy, castration, postoperative complications.

Language of Text: German.

van Os, J.L., P.H. van Laar, E.P. Oldenkamp, and J.S. Verschoor (1981). **Oestrus control and the incidence of mammary nodules in bitches, a clinical study with two progestogens.** *Tijdschrift Voor Diergeneeskunde* 106(2): suppl 3:46-56. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Abstract: The incidence, size and location of mammary nodules were established in 10 practices in The Netherlands by the clinical examination of bitches in which oestrus was

controlled with proligestone (P), 331 animals, or medroxyprogesterone acetate (MAP), 341 animals and in 339 animals never medicated with such compounds. In comparison with the unmedicated control and the P-medicated animals of comparable age the incidence of mammary nodules of all sizes was significantly increased in the MAP-medicated animals. There was no significant difference in nodule incidence between the P-medicated animals and the control animals. Based on the assumption that nodules above a certain size are most likely tumours, these results indicate that oestrus control with MAP stimulates tumour development even in animals medicated for less than four years. The practical value of the reported differences, especially in relation to the subsequent requirement for surgical removal of tumours in bitches, medicated for oestrus control, is discussed.

Descriptors: adverse effects of medroxyprogesterone acetate, mammary nodules, dogs, female, dog diseases, contraception.

Viehoff, F.W. (2002). **Zwelling in buikwand na sterilisatie poes [Swelling in the abdomen after sterilization of a cat]**. *Tijdschrift Voor Diergeneeskunde* 127(23): 739. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: cats, hysterectomy, ovariectomy, hysterectomy, postoperative complications, adverse effects.

Language of Text: Dutch.

Von Berky, A.G. and W.L. Townsend (1993). **The relationship between the prevalence of uterine lesions and the use of medroxyprogesterone acetate for canine population control**. *Australian Veterinary Journal* 70(7): 249-250. ISSN: 0005-0423.

NAL Call Number: 41.8 Au72

Abstract: The prevalence of uterine disease was established during desexing of 175 bitches in the Torres Strait and Cape York, 42 of which had been treated with injectable medroxyprogesterone acetate (MPA) for oestrus postponement. The prevalence of uterine lesions was 45% for treated bitches, 5% for untreated bitches, and 14.9% for the sample population. A highly significant relationship ($P < 0.01$) between MPA treatment and uterine lesions was established. A significant association ($P < 0.05$) between age (> 2 years old) and uterine lesions was found, most likely attributable to a significantly higher proportion ($P < 0.01$) of MPA-treated bitches in the older population. There was no significant difference in the effect of MPA on the prevalence of uterine lesions between older and younger bitches. There was no effect of parity on the prevalence of uterine lesions.

Descriptors: estrus postponement, medroxyprogesterone acetate, uterine lesions, adverse effects, ovariectomy, dogs.

Wallace, M.S. (1991). **The ovarian remnant syndrome in the bitch and queen**. *The Veterinary Clinics of North America: Small Animal Practice* 21(3): 501-507. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Abstract: The ovarian remnant syndrome is a complication of ovariohysterectomy resulting in the presence of functional ovarian tissue in the abdomen. The usual symptom is a return to estrus in a previously ovariohysterectomized bitch or queen. The available methods of diagnosis are vaginal cytologic evaluation during estrus, resting hormone assays, hormone challenge testing, and exploratory laparotomy. Surgical removal of the ovarian remnant is the

preferred treatment.

Descriptors: cats, dogs, estrus, hysterectomy, ovariectomy, adverse effects, ovary physiology, retrospective studies.

Weikel Jr., J.H. and L.W. Nelson (1977). **Problems in evaluating chronic toxicity of contraceptive steroids in dogs.** *Journal of Toxicology and Environmental Health* 3(1-2): 167-177. ISSN: 0098-4108.

NAL Call Number: RA565.A1J6

Abstract: The long-term effects of oral contraceptive steroids including a combination of norethindrone and ethynylestradiol, a sequential regimen of dimethisterone and ethynylestradiol, and daily administration of megestrol acetate were studied in female beagle dogs at dose levels of 1, 10, or 25 times the projected human dose levels. The major findings included cystic endometrial hyperplasia and pyometra requiring hysterectomies and alopecia for the norethindrone-ethynylestradiol and dimethisterone-ethynylestradiol treated dogs. These groups did not have accentuated mammary development or treatment-related hyperplastic or neoplastic changes. For dogs given dimethisterone-ethynylestradiol, numerous acne-like lesions occurred in the skin of the mammary areas. Dogs given the higher dose levels of megestrol acetate had marked mammary stimulation, hyperplastic and neoplastic changes in the mammary glands, and clinical and pathologic changes typical of diabetes mellitus. Mammary changes of nodular hyperplasia, benign mixed tumor, and adenocarcinoma appeared as distinct entities although constant and intense mammary stimulation may be a common denominator. Such mammary changes have not been found in long-term studies in monkeys or rats with megestrol acetate, and the relevance of the canine mammary changes to projecting potential tumorigenesis in women is questioned.

Descriptors: oral contraceptives, norethindrone, ethynylestradiol, megestrol acetate, dogs, complications, alopecia, endometrial hyperplasia, hysterectomy, mammary changes, tumorigenesis, animal models.

Weiss, S. (1995). **Surgical prevention of urinary incontinence of hormonal origin in bitches** [**Chirurgische Prophylaxe der hormonellen Harninkontinenz der Hundin.** *Wiener Tierärztliche Monatsschrift* 82(7): 222-224. ISSN: 0043-535X.

NAL Call Number: 41.8 T345

Descriptors: surgical operations, complications, urination disorders, bitches, postoperative complications, hormones, surgery, ovariectomy, urinary incontinence, dogs.

Werner, R.E., A.J. Straughan, and D. Vezin (1992). **Nylon cable band reactions in ovariohysterectomized bitches.** *Journal of the American Veterinary Medical Association* 200(1): 64-6. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Nylon cable bands used as ligatures caused postsurgical complications in 5 ovariohysterectomized bitches. Clinical signs included fever, stiffness, strangury, draining fistulae, vaginal discharge, and tenesmus. Most signs first appeared several years after surgery, and all signs were resolved after removal of the bands. On the basis of our experience, we suggest that nylon cable bands not be used for ovariohysterectomy ligations. Comment In: *J Am Vet Med Assoc.* 1992 Mar 15;200(6):759

Descriptors: dogs, hysterectomy, nylons adverse effects, ovariectomy, postoperative complications, fistula, granuloma, ligation.

Wilke, M., H. Aupperle, and H.A.G.A. Schoon (1999). **Transcervical collection of endometrial biopsy in the bitch - technique and complications.** *Reproduction in Domestic Animals* 34(1): 19. ISSN: 0936-6768.

NAL Call Number: SF105.A1Z3

Descriptors: endometrial biopsy, collection method, ovariohysterectomy, transcervical cannulation, estrus cycle, fertility.

Wilson, G.P. and H.M. Hayes Jr. (1983). **Ovariohysterectomy in the dog and cat.** In: M.J. Bojrab (editor), *Current Techniques in Small Animal Surgery*, 2nd edition, Lea and Febiger: Philadelphia, PA, p. 334-351. ISBN: 0812108620.

NAL Call Number: SF991.C87 1983

Descriptors: anaesthesia, postoperative complications, caesarean section, hysterectomy, surgery, dogs, cats.

Zambelli D, Melioli M, and Belluzzi S (2001). **Urinary incontinence in dog after castration.** *Veterinaria Cremona* 15(2): 35-40. ISSN: 0391-3151.

Descriptors: castration, medical treatment, postoperative complications, prostate, sex differences, sympathomimetics, urethra, urinary incontinence.

Related Behavior Topics

Bradshaw, J.W.S., P.F. Neville, and D. Sawyer (1997). **Factors affecting pica in the domestic cat.** *Applied Animal Behaviour Science* 52(3-4): 373-379. ISSN: 0168-1591.

NAL Call Number: QL750.A6

Descriptors: pica, feeding behavior, cats.

Chapman, B.L. (1991). **Feline aggression: classification, diagnosis, and treatment.** *The Veterinary Clinics of North America: Small Animal Practice* 21(2): 315-327. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Abstract: Types of aggressive behavior commonly recognized in cats include intermale, territorial, fear/defensive, play, predation, and redirected. Diagnosis is made on the basis of signalment data, the pattern of aggressive postures displayed by the aggressive cat, and the circumstances in which the aggressive behavior occurred. Treatment varies with the type of aggressive behavior but may include neutering, desensitization and counter-conditioning techniques, punishment, drug therapy, and management changes.

Descriptors: aggression, bites, cats, defense mechanisms, fear, maternal behavior, play, predatory behavior, sex behavior, territoriality.

Fox, S.M., D.J. Mellor, K.J. Stafford, C.R. Lowoko, and H. Hodge (2000). **The effects of ovari-hysterectomy plus different combinations of halothane anaesthesia and butorphanol analgesia on behaviour in the bitch.** *Research in Veterinary Science* 68(3): 265-274. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: One hundred and sixty-six behaviours were identified as possible indices of post-operative pain-induced distress in the bitch. These were assessed in bitches after treatment with different combinations of halothane and butorphanol in the absence of surgery and following ovariohysterectomy under halothane anaesthesia with or without butorphanol analgesia given at different stages during the operation. Behaviour was monitored while the bitches were alone (non-interactive) and when routinely examined and handled prior to blood sampling (interactive). Seventy-six of the 166 behaviours occurred so infrequently (less than two occurrences per hour) as to be of no value as indices. Non-interactive behaviours associated with surgery were a decrease in normal speed cage circling and an increase in drawing the rear limbs up in the pike position. The infrequent non-interactive behaviours of incision licking, vomiting and flank gazing were considered to be expressions of pain caused by ovariohysterectomy. During the post-surgical period, bitches given analgesic moved less frequently than those not receiving analgesic. Vocalisation was associated with dysphoria of analgesia rather than pain-induced distress. The behaviour of bitches after ovariohysterectomy suggests that this is a painful procedure which warrants analgesia.

Descriptors: anesthesia, analgesics, animal behavior, butorphanol, halothane, drug combination, dogs, postoperative pain, ovariohysterectomy, posture.

Gerber, H.A., W. Jochle, and F.G. Sulman (1973). **Control of reproduction and of undesirable social and sexual behaviour in dogs and cats.** *The Journal of Small Animal Practice* 14(3): 151-158. ISSN: 0022-4510.

NAL Call Number: 41.8 J8292

Descriptors: animal behavior, cats, contraceptive agents, dogs, estrus, hydroxysteroids, pregnatrienes, progestins, reproduction, sexual behavior, social behavior.

Guy, N.C., U.A. Luescher, S.E. Dohoo, E. Spangler, J.B. Miller, I.R. Dohoo, and L.A. Bate (2001).

Demographic and aggressive characteristics of dogs in a general veterinary caseload.

Applied Animal Behaviour Science 74(1): 15-28. ISSN: 0168-1591.

NAL Call Number: QL750.A6

Descriptors: dogs, characteristics, age, demography, sex, dogbreeds, gonadectomy, aggressive behavior, behavior problems, surveys, questionnaires, veterinary practice.

Hardie, E.M., B.D. Hansen, and G.S. Carroll (1997). **Behavior after ovariohysterectomy in the dog: What's normal?** *Applied Animal Behaviour Science* 51(1-2): 111-128. ISSN: 0168-1591.

NAL Call Number: QL750.A6

Descriptors: pain, stress, surgery, dogs.

Hart, B.L. (2001). **Effect of gonadectomy on subsequent development of age-related cognitive impairment in dogs.** *Journal of the American Veterinary Medical Association* 219(1): 51-56. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine whether gonadectomy predisposes dogs to development of age-related behavioral changes linked to cognitive impairment. DESIGN: Cohort study. ANIMALS: 29 sexually intact male dogs, 63 spayed female dogs, and 47 castrated male dogs 11 to 14 years old. PROCEDURE: Information on possible impairments in 4 behavioral categories linked to cognitive impairment (orientation in the home and yard, social interactions, house training, and sleep-wake cycle) was obtained from owners of the dogs by use of a structured telephone interview format. A second interview was performed 12 to 18 months after the initial interview, and differences in responses were evaluated. RESULTS: Sexually intact male dogs were significantly less likely than neutered dogs to progress from mild impairment (i.e., impairment in 1 category) to severe impairment (i.e., impairment in > or = 2 categories) during the time between the first and second interviews. This difference was not attributable to differences in ages of the dogs, duration of follow-up, or the owners' perceptions of the dogs' overall health. CONCLUSIONS AND CLINICAL RELEVANCE: Results suggest that the presence of circulating testosterone in aging sexually intact male dogs may slow the progression of cognitive impairment, at least among dogs that already have signs of mild impairment. Estrogens would be expected to have a similar protective role in sexually intact female dogs; unfortunately, too few sexually intact female dogs were available for inclusion in the study to test this hypothesis. There may be a need to evaluate possible methods for counteracting the effects of loss of sex hormones in gonadectomized dogs.

Descriptors: gonadectomy, cognition disorders, dogs, estrogens, testosterone, age factors.

- Hart, B.L. and L. Cooper (1984). **Factors relating to urine spraying and fighting in prepubertally gonadectomized cats.** *Journal of the American Veterinary Medical Association* 184(10): 1255-1258. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: cats, castration, fighting, scent marking behavior.
- Hart, B.L. and R.A. Eckstein (1997). **The role of gonadal hormones in the occurrence of objectionable behaviours in dogs and cats.** *Applied Animal Behaviour Science* 52(3-4): 331-344. ISSN: 0168-1591.
NAL Call Number: QL750.A6
Descriptors: sex hormones, domestic animals, sexual dimorphism, castration, behavior problems, dogs, cats.
- Hart, B. (1991). **Effects of neutering and spaying on the behavior of dogs and cats: questions and answers about practical concerns.** *Journal of the American Veterinary Medical Association* 198(7): 1204-1205. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: dogs, cats, castration, ovariectomy, animal behavior, behavior change, behavior patterns.
- Idowu, A.L. (1984). **Effects of castration on certain behavioural problems in dogs.** *Tropical Veterinarian* 2(2): 80-82. ISSN: 0253-4851.
NAL Call Number: SF724.T72
Descriptors: behavior modification, aggressive behavior, castration, dogs.
- Inselman-Temkin, B.R. and J.P. Flynn (1973). **Sex-dependent effects of gonadal and gonadotropic hormones on centrally-elicited attack in cats.** *Brain Research* 60(2): 393-410. ISSN: 0006-8993.
Descriptors: estrogen, testosterone, leutinizing hormone, follicle-stimulating hormone, cats, aggressive behavior, hormone injections, gonadectomy, sexual differentiation of the brain.
- Jochle, W. (1998). **Fehlverhalten und Anpassungsprobleme bei Hund und Katze und deren pharmakologische Beeinflussbarkeit [Abnormal behavior and adaptation problems in dogs and cats and their pharmacologic control].** *Tierarztl Prax Ausg K Klientiere Heimtiere* 26(6): 410-421. ISSN: 1434-1239.
Abstract: Small animal practitioners are increasingly confronted with patients showing adaptation related problems (ARP) which are expressed as disturbed or abnormal behavior (DAB). As a result, practitioners are asked increasingly to euthanize animals which seemingly cannot be socialized. In healthy dogs and cats, three main causes for DAB can be detected: refusal of obedience because of the drive for dominance; anxiety and frustration; and geriatric DAB. Increasingly, disease conditions not readily diagnosed can cause DAB, especially hypothyroidism. Influencing and contributing factors to DAB are breed, sex, experiences as a puppy, behavior of owners, changes in the pet's environment. ARPs may also cause

disturbances in the condition of skin and fur, e.g. atopic dermatitis, pruritus sine materia, lick granuloma, and of the intestinal organs (vomiting, irritated bowel syndrome) and may result in an immune deficiency. Therapeutic approaches include behavioral therapy, surgical or hormonal castration with progestins or antiandrogens, substitution with thyroxin in cases with hypothyroidism, and/or the use of psychopharmaca, most prominently of modern antidepressiva like amitriptyline; buspirone; clomipramine and fluoxetine, but also of selegiline, a mono-aminoxidase inhibitor. These compounds, among other effects, are elevating prolactin levels. This seems to allow to formulate a working hypothesis: in the canine species, prolactin is obviously a hormone enabling socialization; hence all drugs which safely cause an increase in prolactin production might be suitable to manage or control ARPs and DAB in the dog, but also in the cat. Higher levels of prolactin than those required for socialization, as seen in nursing bitches or some clinically overt cases of pseudopregnancy, may cause maternal aggression and can be controlled with prolactin inhibitors, if needed. Article in German, abstract in English.

Descriptors: psychological adaptation, animals, anxiety, cats, dogs, psychotropic drugs, treatment for abnormal behavior, behavioral therapy, castration.

Language of Text: German, Summary in English.

Jochle, W. and M. Jochle (1975). **Reproductive and behavioral control in the male and female cat with progestins: long-term field observations in individual animals.** *Theriogenology* 3(5): 179-185. ISSN: 0093-691X.

NAL Call Number: QP251.A1T5

Descriptors: cats, chlormadinone acetate, comparative study, estrus, female, megestrol, pregnancy, progestins, sexual behavior, social dominance.

Juhr, N.C. (2001). **Die fruehkastration von Hunden aus der sicht der verhaltenskunde [Early castration of dogs from the point of view of behavior].** *Tieraerztliche Umschau* 56(4): 199-200. ISSN: 0049-3864.

NAL Call Number: 41.8 T445

Descriptors: dogs, castration, sterilization method, behavioral problems, urine marking.

Language of Text: German.

Kirsan, I., A. Senünver, and A. Sevimli (1998). **Egitime alinacak disi kopeklerde kisirlastirma operasyonunun onemi [Effects of ovariectomy on the training of bitches].** *Istanbul Universitesi Veteriner Fakultesi Dergisi* 24(2): 355-365. ISSN: 0378-2352.

NAL Call Number: SF1.I78

Descriptors: sterilization, effects, surgery, ovariectomy, training of animals, hysterectomy, dogs.

Language of Text: Turkish; Summary in German.

Notes: CAB.

Knol, B.W. and S.T. Egberink-Alink (1990). **Treatment of problem behaviour in dogs and cats by castration and progestagen administration: A review.** *Tijdschrift Voor Diergeneeskunde* 115(11): 522-527. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: castration, progestagen, dogs, cats, behavior therapy

Kyles, A.E., E.M. Hardie, B.D. Hansen, and M.G. Papich (1998). **Comparison of transdermal fentanyl and intramuscular oxymorphone on post-operative behaviour after ovariohysterectomy in dogs.** *Research in Veterinary Science* 65(3): 245-251. ISSN: 0034-5288.

NAL Call Number: 41.8 R312

Abstract: The effects of transdermal fentanyl and i.m. oxymorphone on behavioural and physiological responses, after ovariohysterectomy in dogs, were investigated. The study involved three groups of 10 dogs: fentanyl/surgery (FS), oxymorphone/surgery (OS), fentanyl/control (FC). A transdermal fentanyl delivery system (50 microg hour⁻¹) (FS and FC) was applied 20 hours before surgery, or i.m. oxymorphone (OS) was administered. After ovariohysterectomy (FS and OS) or anaesthesia alone (FC), dogs were continuously videotaped for 24 hours and a standardised hourly interaction with a handler performed. The videotapes were analysed, and interactive and non-interactive behaviours evaluated. In addition, pain and sedation scores, pulse and respiratory rates, rectal temperature, arterial blood pressure, plasma cortisol and plasma fentanyl concentrations were measured. This study showed that transdermal fentanyl and i.m. oxymorphone (0.05 mg kg⁻¹) produced comparable analgesic effects over a 24 hour recording period. I.m. oxymorphone produced significantly more sedation and lower rectal temperatures than transdermal fentanyl. There were no significant differences between groups in respiratory and heart rates, and arterial blood pressures.

Descriptors: postoperative pain, pain score, respiration, heart rate, cortisol, administration and dosage of fentanyl, animal behavior, ovariohysterectomy, arterial blood pressure, dogs, oxymorphone.

Line, S. and V.L. Voith (1986). **Dominance aggression of dogs towards people: Behavior profile and response to treatment.** *Applied Animal Behaviour Science* 16(1): 77-83. ISSN: 0168-1591.

NAL Call Number: QL750.A6

Descriptors: aggressive behavior, dogs, treatment.

Maarschalkerweerd, R.J., N. Endenburg, J. Kirpensteijn, and B.W. Knol (1997). **Influence of orchietomy on canine behaviour.** *The Veterinary Record* 140(24): 617-669. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: One hundred and twenty-two dog owners were interviewed to obtain information about the effects of orchietomy on the behaviour, unwanted side effects, and testosterone-dependent disease processes in their dogs. Behavioural problems were the main reason for orchietomy, unwanted sexual behaviour being the most common, together with roaming, aggression, and abnormal urination behaviour. Objectionable sexual behaviour, inter-male aggression, roaming, and abnormalurination were reduced after orchietomy in approximately 60 per cent of the dogs. The side effects of orchietomy included increased bodyweight, increased appetite and decreased activity in less than 50 per cent of the dogs, and there was a significant relationship between increased appetite and bodyweight. The

clinical signs of testosterone-dependent disease in most of the dogs either decreased or disappeared after orchiectomy.

Descriptors: aggression, appetite, animal behavior, body weight, comparative study, dogs, incidence, orchiectomy, prostatic hyperplasia, sexual behavior, urination disorders.

McKeown, D.B., U.A. Luescher, and M.A. Machum (1988). **Aggression in feline housemates: A case study.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 29(9): 742-743. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: aggressive behavior, cats, behavior modification, case reports.

Mikkelsen, J. and J.D. Lund (1999). **Affivning af hunde pa grund af adfaerdsproblemer: En epidemiologisk undersogelse over euthanasi af hunde i Danmark - med saerlig fokus pa aggressionsproblemer [Euthanasia of dogs because of behaviour problems: An epidemiological study of euthanasia of dogs in Denmark with special attention to aggression problems].** *Dansk Veterinaertidsskrift* 82(11): 474-479. ISSN: 0106-6854.

NAL Call Number: 41.9 D23

Descriptors: behavior, aggression, euthanasia, body weight influence, breed, neutering, obedience training.

Language of Text: Danish; Summary in English.

Misner, T. and K. Houpt (1998). **Animal behavior case of the month.** *Journal of the American Veterinary Medical Association* 213(9): 1260-1262. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: aggression, ovariectomy, dogs, adoption, guarding behavior, mibolerone, anabolic steroids, dominance, progestins.

Neilson, J.C., R.A. Eckstein, and B.L. Hart (1997). **Effects of castration on problem behaviors in male dogs with reference to age and duration of behavior.** *Journal of the American Veterinary Medical Association* 211(2): 180-182. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine whether 9 problem behaviors in adult male dogs were affected by castration and to examine the influence of age and duration of problem behavior on behavioral effects of castration. DESIGN: Cohort study. ANIMALS: 57 male dogs > 2 years old at the time of castration that had > or = 1 of the targeted problem behaviors. PROCEDURE: Data were collected by telephone contact with owners to identify dogs that had > or = 1 problem behavior before castration and to estimate the improvement (ie, decrease) in the objectionable behaviors after castration. Problem behaviors of interest included urine marking in the house, mounting, roaming, fear of inanimate stimuli, aggression toward human family members, aggression toward unfamiliar people, aggression toward other dogs in the household, aggression toward unfamiliar dogs, and aggression toward human territorial intruders. RESULTS: Effects of castration on fear of inanimate stimuli or aggression toward unfamiliar people were not significant. For urine marking, mounting, and roaming, castration resulted in an improvement of > or = 50% in > or = 60% of dogs and an improvement of > or = 90% in 25 to 40% of dogs. For remaining behaviors, castration resulted in

an improvement of > or = 50% in < 35% of dogs. Significant correlations were not found between the percentage of improvement and age of the dog or duration of the problem behavior at the time of castration. **CLINICAL IMPLICATIONS:** Castration was most effective in altering objectionable urine making, mounting, and roaming. With various types of aggressive behavior, including aggression toward human family members, castration may be effective in decreasing aggression in some dogs, but fewer than a third can be expected to have marked improvement. Age of the dog or duration of the problem behavior does not have value in predicting whether castration will have a beneficial effect.

Descriptors: aggression, aging, animal behavior, dogs, orchiectomy, sex behavior.

Reisner, I.R. (2003). **Differential diagnosis and management of human-directed aggression in dogs.** *The Veterinary Clinics of North America Small Animal Practice* 33(2): 303-320. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Descriptors: behavior, human directed aggression, rage syndrome, behavior modification, castration, ovariectomy.

Rutherford, K.M.D. (2002). **Assessing pain in animals.** *Animal Welfare* 11(1): 31-53. ISSN: 0962-7286.

NAL Call Number: HV4701.A557

Descriptors: animals, pain, poultry, debeaking, lambs, docking, tail, castration, dogs, ovariectomized females, ovariectomy, postoperative care, analgesics, stimuli, avoidance conditioning, animal behavior, literature reviews.

Salman MD, Hutchison J, Ruch Gallie R, Kogan L, New JC Jr., Kass PH, and Scarlett JM (2000). **Behavioral reasons for relinquishment of dogs and cats to 12 shelters.** *Journal of Applied Animal Welfare Science* 3(2): 93-106. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: aggression, pets, animal behavior, animal welfare

Salmeri, K., M. Bloomberg, S. Scrugs, and V. Shille (1991). **Gonadectomy in immature dogs: effects on skeletal, physical, and behavioral development.** *Journal of the American Veterinary Medical Association* 198(7): 1193-1203. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, castration, ovariectomy, skeletal development, feed intake, liveweight gain, animal behavior, body fat, secondary sexual traits.

Schmidt W.D. (2002). *Verhaltenstherapie Des Hundes [Behavioural Therapy in Dogs]*, Schlütersche GmbH & Co. KG, Verlag und Druckerei: Hannover, Germany, 176 pp. p. ISBN: 3-87706-674-7.

Descriptors: abnormal behaviour, aggression, animal behaviour, neuroses, therapy.

Schwartz, S. (1999). **Use of cyproheptadine to control urine spraying in a castrated male domestic cat.** *Journal of the American Veterinary Medical Association* 215(4): 501-502. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, cyproheptadine, drug therapy, urine, marking, behavior disorders, castration, behavior modification.

Sherman, C.K., I.R. Reisner, L.A. Taliaferro, and K.A. Houpt (1996). **Characteristics, treatment, and outcome of 99 cases of aggression between dogs.** *Applied Animal Behaviour Science* 47(1-2): 91-108. ISSN: 0168-1591.

NAL Call Number: QL750.A6

Descriptors: aggression, dogs.

Stubbs, W.P., M.S. Bloomberg, S.L. Scruggs, V.M. Shille, and T.J. Lane (1996). **Effects of prepubertal gonadectomy on physical and behavioral development in cats.** *Journal of the American Veterinary Medical Association* 209(11): 1864-1871. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine the effect of prepubertal gonadectomy on physical and behavioral development in cats. DESIGN: Prospective controlled study of kittens randomly assigned to 3 treatment groups: group 1, neutered at 7 weeks of age; group 2, neutered at 7 months of age; and group 3, sexually intact controls. ANIMALS: 31 clinically normal male and female kittens. PROCEDURE: Age at distal radial physal closure and mature radius length were determined radiographically. Six behavioral characteristics were recorded monthly. At 1 year of age, body weight was recorded and thickness of the falciform ligament was measured from a lateral abdominal radiographic view. Secondary sex characteristics were also examined at 1 year of age. RESULTS: There were no differences between group-1 and group-2 cats for any of the study variables. Sexually intact cats (group 3) weighted significantly less than group-2 cats and had less falciform fat and earlier distal radial physal closure than cats of both neutered groups. Group-3 cats manifested greater intraspecies aggression, less affection, and greater development of secondary sex characteristics than neutered cats. CLINICAL IMPLICATIONS: Neutering cats at 7 weeks of age had similar effects on physical and behavioral development, compared with neutering at the more traditional age of 7 months. These data lend support to the concept of prepubertal gonadectomy, already performed by many animal shelters/humane organizations, as a method of enhancing the effectiveness of pet population control programs.

Descriptors: cats, gonadectomy, skeletal development, body-weight, animal behavior, body composition, early age neutering, radiography, sexual maturation, age factors.

van den Berg, L., M.B. Schilder, and B.W. Knol (2003). **Behavior genetics of canine aggression: behavioral phenotyping of golden retrievers by means of an aggression test.** *Behavior Genetics* 33(5): 469-483. ISSN: 0001-8244.

NAL Call Number: QH301.B45

Abstract: Molecular genetic analysis of complex traits such as aggression strongly depends on careful phenotyping of individuals. When studying canine aggression, the information provided by the owners of the dogs is often not detailed and reliable enough for this purpose. Therefore we subjected 83 golden retrievers, both aggressive and nonaggressive individuals, to a behavioral test. These tests were analyzed with help of an ethogram, resulting in a behavioral profile for each of the dogs. In this article three methods are described of convert-

ing these profiles into a measure of behavioral phenotype. The usefulness of the methods is evaluated by comparing the test results with information provided by owners. Moreover, the hypothesis underlying all these methods, that a lowered threshold for aggressive behavior in general is present in the dogs, is also evaluated. Future research will need to reveal whether the methods meet the high standards that are necessary for studying complex traits.

Descriptors: aggression, dogs, fear, orchiectomy, ovariectomy, behavioral genetics.

Wright, J.C. and R.T. Amoss (2004). **Prevalence of house soiling and aggression in kittens during the first year after adoption from a humane society.** *Journal of the American Veterinary Medical Association* 224(11): 1790-1796. ISSN: 0003-1488.

Descriptors: time of neutering, animal shelter, aggression, questionnaire, animal behavior, owner survey, cats.

Early Spay-Neuter

Anonymous (2001). **When should bitches be neutered.** *The Veterinary Record* 148(16): 491-493. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: attitude of health personnel, dogs, ovariectomy, age factors, postoperative complications.

Aronsohn, M.G. and A.M. Faggella (1993). **Surgical techniques for neutering 6- to 14-week-old kittens.** *Journal of the American Veterinary Medical Association* 202(1): 53-55. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Ninety-six kittens (48 males and 48 females) between the ages of 6 and 14 weeks were neutered. There were no important anesthetic complications, or complications during or after surgery. Pediatric neutering of kittens is a low-risk procedure when specific guidelines are followed. It is recommended that a complete preanesthetic evaluation be performed, a quiet and warm preoperative and postoperative environment be provided, handling of kittens be minimized, bleeding during surgery be meticulously controlled, fragile pediatric tissues be handled gently, kittens be offered food shortly after standing to prevent hypoglycemia, and dextrose be administered PO or IV if recovery is prolonged.

Descriptors: age factors, animals, castration, cat diseases, cats, cryptorchidism, female, intra-operative complications, male, postoperative complications.

Buff, S. (2001). **Reproduction des carnivores domestiques: Sterilisation tres precoce: de nombreux avantages [Early neutering in dogs and cats: numerous advantages].** *Le Point Veterinaire* 32(221): 52-54. ISSN: 0303-4997.

NAL Call Number: SF602.P6

Descriptors: age, bones, castration, hysterectomy, mammary gland neoplasms, ovariectomy, prostate, young animals.

Language of Text: French; Summary in English.

Buff, S. (2001). **Reproduction des carnivores domestiques. Sterilisation tres precoce: de nombreux avantages [Early neutering in dogs and cats: numerous advantages].** *Le Point Veterinaire* 32(221): 52-54. ISSN: 0335-4997.

NAL Call Number: SF602.P6

Descriptors: dogs, cats, sterilization, males, females, age, timing, canidae, carnivora, felidae, mammals, sex.

Language of Text: French.

Buff, S. and A.J. de Vargas Cheuiche (2002). **Castracao e ovariectomia de filhotes: um procedimento com muitas vantagens [Early neutering of dogs and cats: numerous advantages].** *A Hora Veterinaria* 22(127): 58-60. ISSN: 0101-9163.

Descriptors: age, castration, kittens, male genital diseases, mammary gland neoplasms, puppies.

Language of Text: Portuguese; Summary in English and French.

Carrig, C.B., I.M. Gourley, and A.L. Philbrick (1972). **Primary abdominal pregnancy in a cat subsequent to ovariectomy.** *Journal of the American Veterinary Medical Association* 160(3): 308-318. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: ovariectomy, cat diseases, pregnancy complications, postoperative complications.

Chalifoux, A., G. Niemi, P. Fanjoy, and B. Pukay (1981). **Early spay-neutering of dogs and cats.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 22(12): 381. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: postoperative complications, gonadectomy, dogs, cats.

Dowling, S.P. (1997). **Opposition to prepubertal gonadectomies in cats.** *Journal of the American Veterinary Medical Association* 210(3): 321. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: risk of early spay neuter, lower urinary tract disease.

Notes: This letter provides comment on (Stubbs et. al., 1996).

Faggella, A.M. and M.G. Aronsohn (1993). **Anesthetic techniques for neutering 6- to 14-week-old kittens.** *Journal of the American Veterinary Medical Association* 202(1): 56-62. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Forty-eight male and 48 female 6- to 14-week-old kittens were neutered by use of 4 anesthetic protocols. Preanesthetic disposition, depth of sedation, loss of resistance to handling, induction quality, induction time, sternal and stand times, and recovery quality were evaluated. Analgesia and muscle relaxation without supplemental inhalational anesthetics were evaluated in male kittens, and the time until extubation was recorded in female kittens. Intramuscular administration of tiletamine/zolazepam (TZ), midazolam/ketamine, atropine/midazolam/ketamine/butorphanol (AMKB), and atropine/midazolam/ketamine/oxymorphone (AMKO) produced rapid sedation and smooth induction into anesthesia. In male kittens, there were no significant differences in sedation, relaxation, induction time, or quality. Tiletamine/zolazepam administration induced the best analgesia, and midazolam/ketamine administration induced the least analgesia for castration. The recovery time in male kittens was longest with TZ and shortest with the opioid groups (AMKB, AMKO). In females, TZ produced significantly faster induction times, but the degree of sedation and relaxation after administration of injectable agents was not significantly different among the groups. More females given TZ could be intubated without supplemental inhalational agents than females in other groups. Extubation time was rapid in all groups, but the times until sternal and standing were significantly longer, and recovery quality was significantly poorer

in females given TZ. In kittens given opioids, reversal of the opioid did not shorten recovery time or improve recovery quality.

Descriptors: analgesia, anesthesia, butorphanol, castration, cats, drug combinations, drug effects on heart rate and respiration, ketamine, midazolam, oxymorphone, preanesthetic medication, tiletamine, zolazepam.

Faggella, A.M. and M.G. Aronsohn (1994). **Evaluation of anesthetic protocols for neutering 6- to 14-week-old pups.** *Journal of the American Veterinary Medical Association* 205(2): 308-14. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Ninety-nine 6- to 14-week-old pups were given anesthetic agents according to 10 anesthetic protocols. Mean quality rating scores were determined to compare anesthetic protocols. In male pups, IV administration of propofol (6.5 mg/kg of body weight) 15 minutes after IM administration of atropine (0.04 mg/kg) and oxymorphone (0.22 mg/kg) provided the best quality anesthesia. Intramuscular administration of midazolam (0.22 mg/kg) and butorphanol (0.44 mg/kg) instead of oxymorphone provided little sedation, but induced good analgesia. Atropine/oxymorphone/midazolam/xylazine, atropine/butorphanol/midazolam/xylazine, and tiletamine/zolazepam were unsatisfactory combinations for use in castration of 6- to 14-week-old male pups. In female pups, IV administration of propofol (3.4 mg/kg) 15 minutes after IM administration of atropine (0.04 mg/kg) and oxymorphone (0.11 mg/kg) was the most effective anesthetic protocol. Administration of the drugs according to this protocol enabled a pup to be intubated. Anesthesia was maintained with isoflurane in oxygen. If inhalational induction was preferred, IM administration of 13.2 mg of tiletamine/zolazepam/kg, 0.04 mg of atropine/kg and 0.11 mg of oxymorphone/kg, or 0.22 mg of midazolam/kg and 0.44 mg of butorphanol/kg may be used prior to mask delivery of inhalational anesthetics. In female pups, it was not advantageous to combine midazolam with oxymorphone, and use of high dosages of oxymorphone (0.22 mg/kg) or midazolam/butorphanol provided little sedation. Time of recovery after use of tiletamine/zolazepam was the longest for the combinations used, but did not adversely affect pups. Male pups were castrated via scrotal incisions, using hemostatic clips. Ovariohysterectomies were performed via a ventral abdominal midline approach, using hemostatic clips for ligation, five females developed signs of inflammation at the surgical site within 1 to 2 weeks after surgical, and were treated conservatively with warm compresses.

Descriptors: anesthesia, dogs, hysterectomy, orchiectomy, ovariectomy, analgesia, adverse effects of anesthetics, muscle relaxation, postoperative complications.

Goeree, G. (1998). **Pediatric neuters can be technically challenging.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 39(4): 244. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: kittens, puppies, castration, ovariectomy.

Gourley, J. (1997). **When to spay dogs and cats.** *The Veterinary Record* 140(4): 104. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: age, animals, methods of castration, cats, dogs, sex maturation, prepubertal gonadectomy.

Guarneri Boe, M.A. and D. Lange (1995). **When to neuter: the controversy.** *Iowa State University Veterinarian* 57(1): 6-9. ISSN: 0099-5851.

Descriptors: kittens, surgery, age, anaesthesia, postoperative complications, castration, cats.

Gunzel-Apel, A.R. (1998). **Fruhkastration von Hunden und Katzen unter Tierschutzgesichtspunkten [Early castration of dogs and cats from the point of view of animal welfare].** *Deutsche Tierärztliche Wochenschrift* 105(3): 95-98. ISSN: 0341-6593.

NAL Call Number: 41.8 D482

Abstract: The castration of dogs and cats is regulated in section 6 of the German Law for Prevention of Cruelty To Animals (Tierschutzgesetz) dated February 17, 1993. Gonadectomy in juvenile and prepubertal as well as in adult vertebrates is only permitted by law in case of a medical indication or a special using of the animal. On account of his special knowledge, the veterinarian is made responsible by law for the estimation of the indispensibility and for the performance of castration. As early-age castration means usually the surgical removal of healthy gonads from a healthy organism, it is principally forbidden by law at present. The bill of June 30, 1995 points to the legitimation of castration for contraception. This does, however, not dispense the veterinarian from deciding in each individual case under consideration of unwanted side effects and consequences that can be caused by castration and early-age castration, respectively.

Descriptors: animal welfare, prepubertal gonadectomy, castration, ovariectomy, sex maturation, cats, dogs.

Language of Text: German, Summary in English.

Hart, B.L. and L. Cooper (1984). **Factors relating to urine spraying and fighting in prepubertally gonadectomized cats.** *Journal of the American Veterinary Medical Association* 184(10): 1255-1258. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, castration, fighting, scent marking behavior.

Herron, M. (1972). **The effect of prepubertal castration on the penile urethra of the cat.** *Journal of the American Veterinary Medical Association* 160(2): 208-211. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: castration, cats, male, penis, testosterone, time factors, urethra.

Hilsenroth, R. (1999). **Pediatric neutering of dogs.** *Canine Practice* 24(1): 24. ISSN: 1057-6622.

NAL Call Number: SF991.A1C3

Descriptors: puppies, castration, age.

Hoskins, J.D. (1999). **Paediatrics: puppies and kittens.** *The Veterinary Clinics of North America: Small Animal Practice* 29(4): 837-1027. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Descriptors: pediatrics, young animal diseases, congenital abnormalities, cat diseases, dog

diseases, newborn animals, veterinary practice, mycoses, helminthoses, myiasis, protozoal infections, viral diseases, bacterial diseases.

Howe, L.M. (1999). **Prepubertal gonadectomy in dogs and cats. I.** *Compendium on Continuing Education for the Practicing Veterinarian* 21(2): 103-111, 176. ISSN: 0193-1903.

NAL Call Number: SF601.C66

Descriptors: puppies, kittens, castration, ovariectomy, preanesthetic medication, anesthesia, body heat loss, clinical examination, fluid therapy.

Howe, L.M. (1999). **Prepubertal gonadectomy in dogs and cats. II.** *Compendium on Continuing Education for the Practicing Veterinarian* 21(3): 197-201, 267. ISSN: 0193-1903.

NAL Call Number: SF601.C66

Descriptors: puppies, kittens, ovariectomy, castration, tattooing, postoperative complications.

Howe, L.M. (1997). **Short-term results and complications of prepubertal gonadectomy in cats and dogs.** *Journal of the American Veterinary Medical Association* 211(1): 57-62. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine short-term results and complications of prepubertal gonadectomy in cats and dogs. DESIGN: Prospective randomized study. ANIMALS: 775 cats and 1,213 dogs. PROCEDURE: Animals undergoing gonadectomy were allotted into 3 groups on the basis of estimated age (group 1, < 12 weeks old; group 2, 12 to 23 weeks old; group 3, > or = 24 weeks old). Complications during anesthesia, surgery, and the immediate postoperative period (7 days) were recorded. Complications were classified as major (required treatment and resulted in an increase in morbidity or mortality) or minor (required little or no treatment and caused a minimal increase in morbidity). An ANOVA was used to detect differences among groups in age, weight, body temperature, and duration of surgery. To detect differences in complication rates among groups, chi 2 analysis was used. RESULTS: Group 1 consisted of 723 animals, group 2 consisted of 532, and group 3 consisted of 733. Group-3 animals had a significantly higher overall complication rate (10.8%) than group-1 animals (6.5%), but did not differ from group-2 animals (8.8%). Differences were not detected among the 3 groups regarding major complications (2.9, 3.2, and 3.0% for groups 1, 2, and 3, respectively), but group-3 animals had significantly more minor complications (7.8%) than group-1 animals (3.6%), but not group-2 animals (5.6%). CLINICAL IMPLICATIONS: In this study, prepubertal gonadectomy did not increase morbidity or mortality on a short-term basis, compared with gonadectomy performed on animals at the traditional age. These procedures may be performed safely in prepubertal animals, provided that appropriate attention is given to anesthetic and surgical techniques.

Descriptors: age factors, cats, dogs, adverse effects of hysterectomy, orchietomy, ovariectomy, population control, postoperative complications.

Howe, L.M. and P.N. Olson (2000). **Prepubertal gonadectomy: early-age neutering of dogs and cats.** In: P. Concannon, E. England and J. Verstegen (editors), *Recent Advances in Small Animal Reproduction*, International Veterinary Information Service: Ithaca, NY.

Online: <http://www.ivis.org> (requires login)

Descriptors: online article, early-age neutering, side effects, recovery times, pet overpopulation, gonadectomy, risks, benefits, veterinarians.

Howe, L.M., M.R. Slater, H.W. Boothe, H.P. Hobson, T.W. Fossum, A.C. Spann, and W.S. Wilkie (2000). **Long-term outcome of gonadectomy performed at an early age or traditional age in cats.** *Journal of the American Veterinary Medical Association* 217(11): 1661-1665. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine long-term results and complications of gonadectomy performed at an early age (prepubertal) or at the traditional age in cats. DESIGN: Cohort study. ANIMALS: 263 cats from animal shelters. PROCEDURE: Cats that underwent gonadectomy were allotted to 2 groups on the basis of estimated age at surgery (traditional age, > or = 24 weeks old; prepubertal, < 24 weeks old). Adoptive owner information was obtained from shelter records, and telephone interviews were conducted with owners to determine physical or behavioral problems observed in the cats after adoption. Follow-up information was obtained from attending veterinarians for cats with complex problems or when owners were uncertain regarding the exact nature of their cat's problem. RESULTS: Compared with traditional-age gonadectomy, prepubertal gonadectomy did not result in an increased incidence of infectious disease, behavioral problems, or problems associated with any body system during a median follow-up period of 37 months. Additionally, the rate of retention in the original adoptive household was the same for cats that underwent prepubertal gonadectomy as those that underwent traditional-age gonadectomy. CONCLUSIONS AND CLINICAL RELEVANCE: Prepubertal gonadectomy may be performed safely in cats without concern for increased incidence of physical or behavioral problems for at least a 3-year period after gonadectomy.

Descriptors: prepubertal gonadectomy, cats, animal welfare, animal behavior, age factors, follow-up studies.

Howe, L.M., M.R. Slater, H.W. Boothe, H.P. Hobson, J.L. Holcom, and A.C. Spann (2001). **Long-term outcome of gonadectomy performed at an early age or traditional age in dogs.** *Journal of the American Veterinary Medical Association* 218(2): 217-221. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine long-term results and complications of gonadectomy performed at an early age (prepubertal) or at the traditional age in dogs. DESIGN: Cohort study. ANIMALS: 269 dogs from animal shelters. PROCEDURE: Dogs that underwent gonadectomy were allotted to 2 groups on the basis of estimated age at surgery (traditional age, > or =24 weeks old; prepubertal, < 24 weeks old). Adoptive owner information was obtained from shelter records, and telephone interviews were conducted with owners to determine physical or behavioral problems observed in the dogs since adoption. Follow-up information was obtained from attending veterinarians for dogs with complex problems or when owners were uncertain regarding the exact nature of their dog's problem. RESULTS: Prepubertal gonadectomy did not result in an increased incidence of behavioral problems or problems associated with any body system, compared with traditional-age gonadectomy, during a median follow-up period of 48 months after gonadectomy. Rate of retention in the

original adoptive household was the same for dogs that underwent prepubertal gonadectomy as those that underwent traditional-age gonadectomy. Infectious diseases, however, were more common in dogs that underwent prepubertal gonadectomy. **CONCLUSIONS AND CLINICAL IMPLICATIONS:** With the exception of infectious diseases, prepubertal gonadectomy may be safely performed in dogs without concern for increased incidence of physical or behavioral problems during at least a 4-year period after gonadectomy.

Descriptors: animal behavior, early age gonadectomy, ovariectomy, orchietomy, prepubertal gonadectomy, dogs, animal shelter, questionnaires.

Hughes, A. (2000). **Early neutering of dogs.** *The Veterinary Record* 147(20): 584. ISSN: 0042-4900.
NAL Call Number: 41.8 V641

Descriptors: age factors, dogs, sterilization, prepubertal gonadectomy.

Ingo, N. (2000). **Kutyák és macskák korai kasztrációja orvosi szempontból [Early castration of the dog and the cat seen from a medical point of view].** *Magyar Allatorvosok Lapja* 122(9): 569-570. ISSN: 0025-004X.

Descriptors: castration, companion animals, veterinary surgery, non-drug therapy.

Language of Text: Hungarian.

Juhr, N.C. (2001). **Die fruehkastration von Hunden aus der sicht der verhaltenskunde [Early castration of dogs from the point of view of behavior].** *Tieraerztliche Umschau* 56(4): 199-200. ISSN: 0049-3864.

NAL Call Number: 41.8 T445

Descriptors: dogs, castration, sterilization method, behavioral problems, urine marking.

Language of Text: German.

Kustritz, M.V. (2002). **Early spay-neuter: clinical considerations.** *Clinical Techniques in Small Animal Practice* 17(3): 124-128. ISSN: 1096-2867.

NAL Call Number: SF911.S45

Abstract: Early spay-neuter is ovariohysterectomy or castration of puppies or kittens 6 to 14 weeks of age. Pediatric animals may have an enhanced response to relatively low doses of anesthetic agents. Animals should be fasted no more than 3 to 4 hours before surgery to prevent hypoglycemia, and hypothermia should be avoided. Heart and respiratory rates must be monitored carefully throughout anesthesia. Pediatric gonadectomy surgeries are quick with minimal bleeding. Anesthetic recovery is rapid. No significant short-term or long-term effects have been reported. Prepubertal gonadectomy is most useful for humane organizations and conscientious breeders wishing to preclude reproduction of pet dogs and cats while placing animals at a young enough age to optimize socialization and training.

Descriptors: anesthesia, animals, cats, dogs, orchietomy, ovariectomy.

Kustritz, M.V. (1999). **Early spay-neuter in the dog and cat.** *The Veterinary Clinics of North America: Small Animal Practice* 29(4): 935-943. ISSN: 0195-5616.

NAL Call Number: SF601.V523

Abstract: Early spay-neuter refers to the surgical sterilization of 8- to 16-week-old animals. Anesthetic and surgical techniques for the dog and cat are described. Pros and cons of prepu-

bertal gonadectomy are discussed, and the veterinary literature is reviewed.

Descriptors: surgical sterilization, prepubertal gonadectomy, anesthesia, veterinary surgery, dog, cat, age factors.

Levy, J.K. (1997). **Pros and cons of prepuberal gonadectomy.** *Journal of the American Veterinary Medical Association* 210(7): 891. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: age of castration, benefits of early spay-neuter, surgical techniques, lower urinary tract disease.

Notes: This letter provides comment on (Dowling, 1997).

Lieberman, L.L. (1997). **Pros and cons of prepuberal gonadectomy.** *Journal of the American Veterinary Medical Association* 210(7): 891. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: feline urologic syndrome, age of gonadectomy, shelter management.

Notes: Comment on article from J Am Vet Med Assoc. 1997 Feb 1; 210(3):321 (Dowling, 1997).

Lieberman, L. (1987). **A case for neutering pups and kittens at two months of age.** *Journal of the American Veterinary Medical Association* 191(5): 518-521. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, cats, gonadectomy, age, young animals.

Lussier, B. (2001). **La sterilisation en bas age chez le chien et le chat [Prepuberal gonadectomy in dogs and cats].** *Le Medecin Veterinaire Du Quebec* 31(2): 82-85. ISSN: 0225-9591.

Descriptors: anesthesia, prepubertal gonadectomy, surgical method, dogs, cats.

Language of Text: French.

Mackie, W.M. (2000). **Early age neutering: perfect for every practice.** *Proceedings of the North American Veterinary Conference: Small Animal and Exotics Edition, Orlando, FL*, Eastern States Veterinary Association: Gainesville, FL, Vol. 14, p. 653-655.

NAL Call Number: SF605.N672

Descriptors: dogs, cats, prepubertal gonadectomy, shelters, anesthesia.

May, C. (1998). **Orthopaedic effects of prepubertal neutering in dogs.** *The Veterinary Record* 142(3): 71-72. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: radius, ulna, castration, surgery, dogs, prepubertal gonadectomy.

Olson, P.N. (2000). **The history and politics of early spay neuter.** *Proceedings of the North American Veterinary Conference: Small Animal and Exotics Edition, Orlando, FL*, Eastern States Veterinary Association: Gainesville, FL, Vol. 14, p. 657-658.

NAL Call Number: SF605.N672

Descriptors: dogs, cats, prepubertal gonadectomy, age factors, historical background.

- Olson P.N. (2003). **Prepuberal gonadectomy (early-age neutering) of dogs and cats**. In: M.V. Root Kustritz (editor), *Small Animal Theriogenology*, Butterworth Heinemann: St. Louis, p. 165-181. ISBN: 0-7506-7408-3.
Descriptors: animal health, animal welfare, bodyweight, gonadectomy, penis, prepuce, surgical operations, urethra, vulva.
- Olson, P.N. (1993). **Prepubertal gonadectomy**. *California Veterinarian* 47(4): 5-6. ISSN: 0008-1612.
NAL Call Number: 41.8 C12
Descriptors: pets, animal welfare, complications, young animals, castration, ovariectomy, cats, dogs
- Olson, P.N., M.V. Kustritz, and S.D. Johnston (2001). **Early-age neutering of dogs and cats in the United States (a review)**. *Journal of Reproduction and Fertility Supplement* 57: 223-232. ISSN: 0449-3087.
NAL Call Number: 442.8 J8222 Suppl.
Abstract: Prepubertal gonadectomy, often referred to as early-age neutering, has increased in popularity in the United States. The procedure is often used at animal care and control facilities, where puppies and kittens are neutered as early as 7 weeks of age or before adoption. Although the anaesthetic and surgical procedures appear to be safe, studies continue to evaluate the long-term effects on health and behaviour. Early-age neutering is one technique that is used to combat pet overpopulation, a problem whereby millions of unwanted healthy dogs and cats are euthanased each year. Although neutering animals is helpful in controlling pet overpopulation, other factors must be considered. In addition, many animals are relinquished to shelters when they show inappropriate behaviours, because owners and veterinarians are unable to modify animal behaviour. This review discusses early-age neutering in the United States, and includes the review of scientific studies that have evaluated this procedure in puppies and kittens. Early-age neutering does not stunt growth in dogs or cats (a once-held belief), but may alter metabolic rates in cats. The anaesthetic and surgical procedures are apparently safe for young puppies and kittens; morbidity is lower and recovery is faster than in adult animals. To date, adverse side effects are apparently no greater in animals neutered at early ages (7 weeks) than in those neutered at the conventional age (7 months).
Descriptors: anesthesia, prepubertal gonadectomy, cats, dogs, possible adverse effects, castration, orchietomy, orchidectomy, hysterectomy, animal behavior.
- Patel, C.M. and D. Yates (2003). **Evaluation of an anaesthetic protocol for the neutering of eight- to 12-week-old puppies**. *The Veterinary Record* 152(14): 439-440. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: aging, adverse effects of anesthesia, inhalation anesthetics, intravenous anesthetics, animal, castration, dogs.
- Poole, C. (1997). **Early neutering of cats and dogs**. *The Veterinary Record* 141(23): 608. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: animal welfare, cats, dogs, female, male, sterilization, adverse effects.

- Richardson, E.F. (1992). **Prepubescent spay and neuter program proposed [for cats and dogs]**. *California Veterinarian* 46(6): 28-29. ISSN: 0008-1612.
NAL Call Number: 41.8 C12
Descriptors: surgical operations, complications, sexual maturity, ovariectomy, castration, cats, dogs.
- Roken, M. (2002). **Prepubertal kastration av katt -- mojlighet eller risk? [Prepubertal neutering of the cat -- a possibility or a risk?]**. *Svensk Veterinartidning* 54(12): 577-585. ISSN: 0346-2250.
NAL Call Number: 41.9 SV23
Descriptors: age, anesthesia, animal behavior, body temperature, castration, drug excretion, drug metabolism, hemorrhage, hypoglycemia, kittens, morbidity, obesity, ovariectomy, recovery, risk, surgery, surgical operations, cats.
- Romatowski, J. (1993). **Early-age neutering, an "uncontrolled experiment"**. *Journal of the American Veterinary Medical Association* 203(11): 1523. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: castration, cats, dogs, postoperative complications, age factors.
Notes: Comment On: J Am Vet Med Assoc. 1993 Sep 1;203(5):591-3.
- Root, M.V., S.D. Johnston, G.R. Johnston, and P.N. Olson (1996). **The effect of prepuberal and postpuberal gonadectomy on penile extrusion and urethral diameter in the domestic cat.** *Veterinary Radiology and Ultrasound* 37(5): 363-366. ISSN: 1058-8183.
NAL Call Number: SF757.8.A4
Descriptors: cats, gonadectomy, age, sexual maturity, penis, urethra, diameter, radiography, analytical methods, body parts, carnivora, developmental stages, dimensions, felidae, genital system, male genital system, mammals, maturity, sterilization, surgical operations, urinary tract, urogenital system, cystourethrography, puberty.
- Root, M.V., S.D. Johnston, and P.N. Olson (1996). **Effect of prepuberal and postpuberal gonadectomy on heat production measured by indirect calorimetry in male and female domestic cats.** *American Journal of Veterinary Research* 57(3): 371-4. ISSN: 0002-9645.
NAL Call Number: 41.8 Am3A
Abstract: OBJECTIVE--To use indirect calorimetry to compare heat production between gonadectomized and sexually intact male and female cats. DESIGN--Male (n = 6) and female (n = 6) kittens were gonadectomized at 7 weeks or 7 months of age, or left sexually intact. Body heat production was measured by indirect calorimetry in all cats at 12, 18, and 24 months of age. ANIMALS--18 male and 18 female clinically normal domestic shorthair cats. PROCEDURE--Heat production was measured, using an open-circuit, respiratory, indirect calorimeter. All cats underwent calorimetry at 12, 18, and 24 months of age. The heat coefficient, a measure of resting metabolic rate, was calculated for each cat at each test; heat coefficient is defined as logarithm of heat (kcal/h) divided by logarithm of body weight (kg). RESULTS--Heat production did not vary with age in male or female cats. Heat coefficient was higher in sexually intact male and female cats than in gonadectomized male and female cats at 12, 18, and 24 months of age (12 months, females, P < 0.01, males, P = 0.04;

18 months, females, $P < 0.01$, males, $P = 0.02$; and 24 months, females and males, $P < 0.01$).
CONCLUSIONS--These data suggest that resting metabolic rate in cats decreases after gonadectomy. CLINICAL RELEVANCE--A decrease in metabolic rate is synonymous with a decrease in caloric requirements. Gonadectomized animals fed in a manner similar to sexually intact animals may be predisposed to obesity and its sequelae.

Descriptors: calorimetry, cats, comparative study, dogs, orchietomy, ovariectomy, sex maturation, reproducibility of results.

Root, M.V., S.D. Johnston, and P.N. Olson (1997). **The effect of prepuberal and postpuberal gonadectomy on radial physéal closure in male and female domestic cats.** *Veterinary Radiology and Ultrasound* 38(1): 42-47. ISSN: 1058-8183.

NAL Call Number: SF757.8.A4

Descriptors: cats, bone formation, growth, gonadectomy, puberty, sex-differences, age at gonadectomy, bone growth.

Root, M.V. (1995). **The effect prepuberal and postpuberal gonadectomy on the general health and development of obesity in the male and female domestic cat.** Dissertation, University of Minnesota: 179 p.

Descriptors: cat, obesity, gonadectomy.

Root, M. (1995). **Early spay-neuter in the cat: Effect on development of obesity and metabolic rate.** *Veterinary Clinical Nutrition* 2: 132-134. ISSN: 1076-3872.

Descriptors: early spay-neuter, cats, obesity, metabolic rate.

Root, M., S. Johnston, G. Johnston, and P. Olson (1996). **The effect of prepubertal and postpubertal gonadectomy on penile extrusion and urethral diameter in the domestic cat.** *Veterinary Radiology and Ultrasound* 37(5): 363-366. ISSN: 1058-8183.

NAL Call Number: SF757.8.A4

Descriptors: cats, gonadectomy, puberty, age, penis, urethra, diameter, radiography.

Salmeri, K.R. (2000). **Health effects of early-age neutering.** In: *Proceedings of the North American Veterinary Conference: Small Animal and Exotics Edition, Orlando, FL*, Eastern States Veterinary Association: Gainesville, FL, Vol. 14, p. 659-660.

NAL Call Number: SF605.N672

Descriptors: dogs, cats, gonadectomy, age, adverse effects, secondary sex characteristics, weight gain, skeletal growth, behavior, gonadal hormones, urethral function.

Salmeri, K., M. Bloomberg, S. Scrugs, and V. Shille (1991). **Gonadectomy in immature dogs: effects on skeletal, physical, and behavioral development.** *Journal of the American Veterinary Medical Association* 198(7): 1193-1203. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, castration, ovariectomy, skeletal development, feed intake, liveweight gain, animal behavior, body fat, secondary sexual traits.

Spain, C., J. Scarlett, and K. Houpt (2004). **Long-term risks and benefits of early-age gonadectomy in cats.** *Journal of the American Veterinary Medical Association* 224(3): 372-379. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To evaluate the long-term risks and benefits of early-age gonadectomy, compared with traditional-age gonadectomy, among cats adopted from a large animal shelter. DESIGN: Retrospective cohort study. ANIMALS: 1,660 cats. PROCEDURE: Cats underwent gonadectomy and were adopted from an animal shelter before 1 year of age; follow-up was available for as long as 11 years after surgery (median follow-up time, 3.9 years). Adopters completed a questionnaire about their cats' behavior and medical history. When possible, the cats' veterinary records were reviewed. Statistical analyses were conducted to identify any associations between the occurrence of 47 medical and behavioral conditions and the cats' age at gonadectomy. RESULTS: Among male cats that underwent early-age gonadectomy (< 5.5 months of age), the occurrence of abscesses, aggression toward veterinarians, sexual behaviors, and urine spraying was decreased, whereas hiding was increased, compared with cats that underwent gonadectomy at an older age. Among male and female cats that underwent early-age gonadectomy, asthma, gingivitis, and hyperactivity were decreased, whereas shyness was increased. CONCLUSIONS AND CLINICAL RELEVANCE: Gonadectomy before 5.5 months of age was not associated with increased rates of death or relinquishment or occurrence of any serious medical or behavioral condition and may provide certain important long-term benefits, especially for male cats. Animal shelters can safely gonadectomize cats at a young age, and veterinarians should consider recommending routine gonadectomy for client-owned cats before the traditional age of 6 to 8 months. **Descriptors:** prepubertal gonadectomy, cats, adoption, animal shelter, questionnaires, benefits, recommendations.

Spain, C., J. Scarlett, and K. Houpt (2004). **Long-term risks and benefits of early-age gonadectomy in dogs.** *Journal of the American Veterinary Medical Association* 224(3): 380-387. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To evaluate the long-term risks and benefits of early-age gonadectomy, compared with traditional-age gonadectomy, among dogs adopted from a large animal shelter. DESIGN: Retrospective cohort study. ANIMALS: 1,842 dogs. PROCEDURE: Dogs underwent gonadectomy and were adopted from an animal shelter before 1 year of age; follow-up was available for as long as 11 years after surgery. Adopters completed a questionnaire about their dogs' behavior and medical history. When possible, the dogs' veterinary records were reviewed. Associations between the occurrence of 56 medical and behavioral conditions and dogs' age at gonadectomy were evaluated. RESULTS: Among female dogs, early-age gonadectomy was associated with increased rate of cystitis and decreasing age at gonadectomy was associated with increased rate of urinary incontinence. Among male and female dogs with early-age gonadectomy, hip dysplasia, noise phobias, and sexual behaviors were increased, whereas obesity, separation anxiety, escaping behaviors, inappropriate elimination when frightened, and relinquishment for any reason were decreased. CONCLUSIONS AND CLINICAL RELEVANCE: Because early-age gonadectomy appears to offer more benefits than risks for male dogs, animal shelters can safely gonadectomize male dogs at a young

age and veterinary practitioners should consider recommending routine gonadectomy for client-owned male dogs before the traditional age of 6 to 8 months. For female dogs, however, increased urinary incontinence suggests that delaying gonadectomy until at least 3 months of age may be beneficial.

Descriptors: prepubertal gonadectomy, adoption, animal shelter, questionnaire, complications, cystitis, urinary incontinence, behavior, benefits.

Stocklin-Gautschi N.M., Hassig M., Reichler I.M., and A.S. Hubler M. (2001). **The relationship of urinary incontinence to early spaying in bitches.** *Journal of Reproduction and Fertility* 57(Suppl.): 233-236. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: It is still controversial whether a bitch should be spayed before or after the first oestrus. It would be desirable to spay bitches at an age that would minimize the side effects of neutering. With regard to the risk of mammary tumours, early spaying must be recommended because the incidence of tumours is reduced considerably. The aim of the present study was to determine whether early spaying also reduces the risk of urinary incontinence. The owners of 206 bitches that had been spayed before their first oestrus and for at least 3 years were questioned on the occurrence of urinary incontinence as a result of spaying. At the time of the enquiry the average age of the bitches was 6.5 years, and the average age at the time of surgery was 7.1 months. Urinary incontinence after spaying occurred in 9.7% of bitches. This incidence is approximately half that of spaying after the first oestrus. Urinary incontinence affected 12.5% of bitches that were of a large body weight (> 20 kg body weight) and 5.1% of bitches that were of a small body weight (< 20 kg body weight). The surgical procedure (ovariectomy versus ovariohysterectomy) had no influence on the incidence, or on the period between spaying and the occurrence of urinary incontinence. Urinary incontinence occurred on average at 2 years and 10 months after surgery and occurred each day, while the animals were awake or during sleep. However, compared with late spaying the clinical signs of urinary incontinence were more distinct after early spaying.

Descriptors: early spay-neuter, complications, mammary tumor development, urinary incontinence, ovariectomy, ovariohysterectomy.

Stolla R (2002). **Spaying before or after first heat? Pros and cons.** *Tierärztliche Praxis* 30(5): 333-338. ISSN: 1434-1239.

NAL Call Number: SF603.V433

Descriptors: adverse effects, age, biological development, bitches, dermatitis, incidence, mammary gland neoplasms, neoplasms, oestrus, ovariectomy, puberty, urinary incontinence.

Stubbs, W.P. and M.S. Bloomberg (1995). **Implications of early neutering in the dog and cat.** *Seminars in Veterinary Medicine and Surgery (Small Animal)* 10(1): 8-12. ISSN: 0882-0511.

NAL Call Number: SF911.S45

Abstract: Early age neutering of dogs and cats is a safe and effective means of pet population control. The surgical techniques are similar to those already familiar to the veterinary practitioner and pose minimal risk to the animal patient. Advantages include a shorter operative time, better intra-abdominal visualization, and rapid animal patient recovery. Prepubertal gonadectomy does not seem to adversely affect skeletal, physical, or behavioral development

in the dog and cat.

Descriptors: cats, dogs, surgery, orchiectomy, ovariectomy, time factors.

Stubbs, W.P., M.S. Bloomberg, S.L. Scruggs, V.M. Shille, and T.J. Lane (1996). **Effects of prepubertal gonadectomy on physical and behavioral development in cats.** *Journal of the American Veterinary Medical Association* 209(11): 1864-1871. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine the effect of prepubertal gonadectomy on physical and behavioral development in cats. DESIGN: Prospective controlled study of kittens randomly assigned to 3 treatment groups: group 1, neutered at 7 weeks of age; group 2, neutered at 7 months of age; and group 3, sexually intact controls. ANIMALS: 31 clinically normal male and female kittens. PROCEDURE: Age at distal radial physal closure and mature radius length were determined radiographically. Six behavioral characteristics were recorded monthly. At 1 year of age, body weight was recorded and thickness of the falciform ligament was measured from a lateral abdominal radiographic view. Secondary sex characteristics were also examined at 1 year of age. RESULTS: There were no differences between group-1 and group-2 cats for any of the study variables. Sexually intact cats (group 3) weighted significantly less than group-2 cats and had less falciform fat and earlier distal radial physal closure than cats of both neutered groups. Group-3 cats manifested greater intraspecies aggression, less affection, and greater development of secondary sex characteristics than neutered cats. CLINICAL IMPLICATIONS: Neutering cats at 7 weeks of age had similar effects on physical and behavioral development, compared with neutering at the more traditional age of 7 months. These data lend support to the concept of prepubertal gonadectomy, already performed by many animal shelters/humane organizations, as a method of enhancing the effectiveness of pet population control programs.

Descriptors: cats, gonadectomy, skeletal development, body-weight, animal behavior, body composition, early age neutering, radiography, sexual maturation, age factors.

Stubbs, W.P., K.R. Salmeric and M.S. Bloomberg (1995). **Early neutering of the dog and cat.** In: J. Bonagura and R. Kirk (editors), *Kirk's Current Veterinary Therapy XII: Small Animal Practice*, W.B. Saunders: Philadelphia, p. 1037-1040. ISBN: 0-7216-5188-7.

NAL Call Number: SF745.K57

Descriptors: pet overpopulation, prepubertal gonadectomy, animal shelters, surgical sterilization, dogs, cats, safety, risks.

Swift, B.J. (2000). **Early neutering of dogs.** *The Veterinary Record* 147(23): 667. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Descriptors: estrus, ovariectomy, dogs, health status, postoperative complications, time factors, urinary incontinence.

Theran, P. (1993). **Early-age neutering of dogs and cats.** *Journal of the American Veterinary Medical Association* 202(6): 914-917. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: dogs, cats, young animals, sterilization, overpopulation, preoperative care, surgery.

Notes: Paper presented at the AVMA Animal Welfare Forum: Overpopulation of unwanted dogs and cats, Nov. 6, 1992, Chicago, IL.

Pet Population Control

Anonymous (1991). **AVMA recommends steps to control pet population.** *Journal of the American Veterinary Medical Association* 198(7): 1113. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, cats, dogs, population control, societies, scientific, veterinary medicine.

Anonymous (1974). **Conclusions and recommendations from the National Conference on the Ecology of the Surplus Dog and Cat Problem.** *Journal of the American Veterinary Medical Association* 165(4): 363-370. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, castration, cats, oral contraceptives, dogs, euthanasia, hysterectomy, veterinary, population control, sterilization.

Anonymous (2001). **Early castration and ID marking is a good way of dealing with the problem of stray cats.** *Norsk Veterinaertidsskrift* 113(11): 726-727. ISSN: 0029-2773.

NAL Call Number: 41.8 N81

Descriptors: animal behavior, animal welfare, castration, identification, professional ethics, stray animals.

Anonymous (1991). **Pet overpopulation.** *Journal of the American Veterinary Medical Association* 198(7): 1151-243. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, animals, domestic, population control, population density.

Anonymous (1974). **The rising surplus of dogs and cats.** *Modern Veterinary Practice* 55(8): 614-618. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: domestic animals, castration, cats, contraceptive agents, contraceptive devices, dogs, hysterectomy, population growth.

Anonymous (1973). **Spay clinics: the other side of the story.** *Modern Veterinary Practice* 54(4): 29-34. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: animals, castration, cats, dogs, population control, societies, reproductive sterilization.

Anonymous (1997). **Spay Day USA: controversy eclipses mutual pursuit.** *Journal of the American Veterinary Medical Association* 211(12): 1495-1497. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: veterinarians role, Doris Day Animal League, pet overpopulation, humane groups, veterinary community, interviews.

Anonymous (1976). **Summary and conclusions: National Conference on Dog and Cat Control.** *Journal of the American Veterinary Medical Association* 168(12): 1125-1134. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, breeding, castration, physiology of cats, contraceptive agents, dogs, veterinary legislation, Megestrol, population control, pregnancy, psychology, public health, sterilization, vasectomy, zoonoses.

Anderson, D.G. (1992). **The control of pet overpopulation.** *Veterinary Technician* 13(2): 119-123, 128. ISSN: 8750-8990.

NAL Call Number: SF406.A5

Descriptors: spaying, neutering, contraceptives, castration, dogs, cats, overpopulation, reproductive physiology, responsible ownership.

Arkow, P. (1991). **Animal control laws and enforcement.** *Journal of the American Veterinary Medical Association* 198(7): 1164-1172. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, animals, population control, population density, United States.

Barrows, P.L. (2002). **Final letters for now on feral cats.** *Journal of the American Veterinary Medical Association* 221(11): 1547. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal care, euthanasia, neutering, sterilization, vaccination, depopulation, free ranging cat problem, pet adoption, public health, sanctuaries, trap-neuter-return program.

Bouw, J. (1972). **Manipulaties met populaties [Manipulations with populations].** *Tijdschrift Voor Diergeneeskunde* 97(6): 365-376. ISSN: 0040-7453.

NAL Call Number: 41.8 T431

Descriptors: domestic animals, population dynamics, population control, The Netherlands.
Language of Text: Dutch.

Bradshaw, J.W.S., G.F. Horsfield, J.A. Allen, and I.H. Robinson (1999). **Feral cats: their role in the population dynamics of *Felis catus*.** *Applied Animal Behaviour Science* 65(3): 273-283. ISSN: 0168-1591.

NAL Call Number: QL750.A6

Descriptors: behavior, population studies, neutering, nutrient requirements, population dynamics, reproductive success, scavenging, sociability.

Cabannes, A., F. Lucchese, H. Pelse, N. Biesel, M. Eymonnot, and M. Appriou (2000). **Castration and feline Borreliosis in Gironde.** *Revue De Medecine Veterinaire* 151(10): 949-954. ISSN: 0035-1555.

NAL Call Number: 41.8 R32

Descriptors: antibodies, castration, epidemiology, males, females, borreliosis.

Carter, C.N. (1990). **Pet population control: another decade without solutions?** *Journal of the American Veterinary Medical Association* 197(2): 192-195. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: domestic animals, cats, dogs, contraception, ovariectomy, orchietomy, hysterectomy, population control.

Castillo, D. and A.L. Clarke (2003). **Trap/neuter/release methods ineffective in controlling domestic cat "colonies" on public lands.** *Natural Areas Journal* 23(3): 247-253. ISSN: 0885-8608.

NAL Call Number: QH76.N37

Descriptors: pest assessment control and management, wildlife management, capture-recapture technique, neutering, photography, trapping, cat colonies, pet management, public lands, release methods.

Centonze, L.A. and J.K. Levy (2002). **Characteristics of free-roaming cats and their caretakers.** *Journal of the American Veterinary Medical Association* 220(11): 1627-1633. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVES: To describe the characteristics of unowned, free-roaming cats and their caretakers who participated in a trap-neuter-return (TNR) program and to determine the effect of the program on free-roaming cat colonies. DESIGN: Prospective study. SAMPLE POPULATION: 101 caretakers of 920 unowned, free-roaming cats in 132 colonies in north central Florida. RESULTS: Most (85/101; 84%) caretakers were female. The median age was 45 years (range, 19 to 74 years). Most (89/101; 88%) caretakers owned pets and of those, most (67/101; 66%) owned cats. The major reasons for feeding free-roaming cats were sympathy and love of animals. Most caretakers reported that the cats they cared for were too wild to be adopted, but many also reported that they considered the cats to be like pets. The total surveyed cat population was 920 before participation in TNR and 678 after TNR. Mean colony size was 7 cats before TNR and 5.1 cats after TNR. Most cats lived on the caretaker's property. At the time of the survey, 70% (644/920) of the cats had been neutered. CONCLUSIONS AND CLINICAL RELEVANCE: The decrease in the surveyed free-roaming cat population was attributed to a reduction in births of new kittens, adoptions, deaths, and disappearances. Recognition of the human-animal bond that exists between caretakers and the feral cats they feed may facilitate the development of effective control programs for feral cat populations.

Descriptors: trap-neuter-return program, cats, caregivers, castration, human-animal bond, population control, quality of life, questionnaires.

Chassy, L.M. (2003). **Discussions on TNR programs continue.** *Journal of the American Veterinary Medical Association* 222(6): 712; author reply 712. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, animals, veterinary surgery, castration, cats, demography, euthanasia, female, male, population control, population dynamics, reproduction.

Chatterjee, S.N. and A.B. Kar (1968). **Chemical sterilization of stray dogs.** *Indian Veterinary Journal* 45(8): 649-654. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: animals, cadmium, dogs, male, sterilization, testis.

Clifton, M. (1998). **Animal populations may not be out of control.** *Journal of the American Veterinary Medical Association* 213(5): 603. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, cats, population control, United States.

Eze, C.A. and M.C. Eze (2002). **Castration, other management practices and socio-economic implications for dog keepers in Nsukka area, Enugu state, Nigeria.** *Preventive Veterinary Medicine* 55(4): 273-280. ISSN: 0167-5877.

NAL Call Number: SF601.P7

Descriptors: animal husbandry, castration, dog keeping practices, socio-economics.

Fayrer-Hosken, R.A., H.D. Dookwah, and C.I. Brandon (2000). **Immunocontrol in dogs.** *Animal Reproduction Science* 60-61: 365-373. ISSN: 0378-4320.

NAL Call Number: QP251.A5

Abstract: Population control in dogs and cats is an important goal for many groups. Control measures over the years has included surgery, hormonal therapy and more recently immunological control. The current presentation discusses dog population control with an emphasis on immunologic control. Specifically, vaccination with purified zona pellucida (ZP) glycoproteins leads initially to immunocontraception and then to the profound and irreversible changes of immunosterilization. The preliminary studies are extremely encouraging on developing a vaccine for lasting canine population control.

Descriptors: dogs, egg proteins, membrane glycoproteins, population control, methods of sterilization, vaccination.

Fox, M.W. (1990). **Pet population control.** *Journal of the American Veterinary Medical Association* 197(6): 682. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, contraception, population control.

Fredrickson, L.E. (1975). **Solve the pet population crisis with pet planning programs.** *Modern Veterinary Practice* 56(2): 93-95. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: animals, cats, dogs, population control, public relations, television.

Gibson, K.L., K. Keizer, and C. Golding (2002). **A trap, neuter, and release program for feral cats on Prince Edward Island.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 43(9): 695-698. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: cats, kittens, trapping, stray animals, gonadectomy, vaccination, release, feline leukemia virus, feline immunodeficiency virus, population control.

Goeree, G. (1998). **A different approach to controlling the cat population.** *The Canadian Veterinary Journal: La Revue Veterinaire Canadienne* 39(4): 242-243. ISSN: 0008-5286.

NAL Call Number: 41.8 R3224

Descriptors: animal welfare, cats, orchietomy, ovariectomy, methods of population control, economics of sterilization.

Griffin, B. (2001). **Prolific cats: the impact of their fertility on the welfare of the species.** *Compendium on Continuing Education for the Practicing Veterinarian* 23(12): 1058-1069. ISSN: 0193-1903.

NAL Call Number: SF601.C66

Descriptors: cats, female animals, parturition, parturition complications, colostrum immunity, contraception, immunization, GnRH, zona pellucida, ovariectomy, overpopulation, animal welfare, ovariohysterectomy, feral cats.

Gunther, I. and J. Terkel (2002). **Regulation of free-roaming cat (*Felis silvestris catus*) populations: a survey of the literature and its application to Israel.** *Animal Welfare* 11(2): 171-188. ISSN: 0962-7286.

NAL Call Number: HV4701.A557

Descriptors: cats, animal welfare, urban environment, population control, gonadectomy, sterilization, literature reviews.

Hazard, H.E. and J.I. Freeman (1997). **Spay Day USA: controversy eclipses mutual pursuit. Interview by Susan C. Kahler.** *Journal of the American Veterinary Medical Association* 211(12): 1495-1497. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, animals, castration, cats, dogs, veterinarians.

Heussner, J.C. and W.E. Grant (1978). **Ecological aspects of urban dog management: a simulation model.** *Animal Regulation Studies* 1(4): 355-374. ISSN: 0378-4282.

NAL Call Number: HV4701.A52

Descriptors: canine population control, pets, stray dogs, animal shelters, simulation, management schemes, neutering, public education for proper pet ownership.

Hsu YuYing, L.L. Severinghaus, and J.A. Serpell (2003). **Dog keeping in Taiwan: its contribution to the problem of free-roaming dogs.** *Journal of Applied Animal Welfare Science* 6(1): 1-23. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: survey, dog ownership practices, rates of neutering, behavioral problems, dogs, religious and cultural taboos, childhood experiences, stray dogs, low cost neutering, shelter relinquishment, Taiwan.

Hughes, K.L. and M.R. Slater (2002). **Implementation of a feral cat management program on a university campus.** *Journal of Applied Animal Welfare Science* 5(1): 15-28. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Abstract: In August 1998, Texas AM University implemented on campus a trap-test-vaccinate-alter-return-monitor (TTVARM) program to manage the feral cat population. TTVARM is an internationally recognized term for trapping and neutering programs aimed at management of feral cat populations. In this article we summarize results of the program for the period August 1998 to July 2000. In surgery laboratories, senior veterinary students examined cats that were humanely trapped once a month and tested them for feline leukemia and feline immunodeficiency virus infections, vaccinated, and surgically neutered them. They euthanized cats testing positive for either infectious disease. Volunteers provided food and observed the cats that were returned to their capture sites on campus and maintained in managed colonies. The program placed kittens and tame cats for adoption; cats totaled 158. Of the majority of 158 captured cats, there were less kittens caught in Year 2 than in Year 1. The proportion of tame cats trapped was significantly greater in Year 2 than in Year 1. The prevalence found for feline leukemia and feline immunodeficiency virus ELISA test positives was 5.8% and 6.5%, respectively. Following surgery, 101 cats returned to campus. The project recaptured, retested, and revaccinated more than one-fourth of the cats due for their annual vaccinations. The program placed 32 kittens, juveniles, and tame adults for adoption. The number of cat complaints received by the university's pest control service decreased from Year 1 to Year 2.

Descriptors: feral cat population control, animal welfare, castration, population dynamics, veterinary students, euthanasia, vaccination.

Hughes K.L., Slater M.R., and Haller L. (2002). **The effects of implementing a feral cat spay/neuter program in a Florida county animal control service.** *Journal of Applied Animal Welfare Science* 5(4): 285-298. ISSN: 0002-9645.

NAL Call Number: 41.8 Am3A

Descriptors: euthanasia, ovariectomy, population control.

Jessup, D.A., P.L. Barrows, L. Winter, and C.M. Storts (2003). **TNR debates still active.** *Journal of the American Veterinary Medical Association* 223(9): 1254-1255; author reply 1255-1256. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, animals, California, castration, cats, euthanasia, methods of population control.

Jochle, W. (1991). **Pet population control in Europe.** *Journal of the American Veterinary Medical Association* 198(7): 1225-30. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, cats, dogs, Europe, population control.

Jochle, W. (1974). **[Progress in small animal reproductive physiology, therapy of reproductive disorders, and pet population control].** *Folia Veterinaria Latina* 4(4): 706-731. ISSN: 0301-0724.

NAL Call Number: SF604.F62

Descriptors: castration, cats, chlormadinone acetate, contraceptive agents, dogs, estrogens, estrus, luteinizing hormone, ovulation, population control, progesterone, progestins, prostaglandins, prostatic hyperplasia, pseudopregnancy, reproduction, sexual behavior.

Language of Text: English and Italian.

Josa J.M. and P. del Canizo (1999). **Population control programme [for pet species].** *Medicina Veterinaria* 16(12): 583-586. ISSN: 0212-8292.

Descriptors: castration, ovariectomy, gonadectomy, sterilization, animal welfare.

Kalz B. and K.M. Scheibe (2001). **Verwilderte Hauskatzen in einem Untersuchungsgebiet in Berlin-Mitte -- Populationsbiologie und Einfluss der Kastration. [Feral cats in a study area of the Berlin city -- population biology and influence of castration].** In: *Aktuelle Arbeiten zur artgemassen Tierhaltung. Vortrage anlässlich der 32. Internationalen Arbeitstagung Angewandte Ethologie bei Nutztieren der Deutschen Veterinärmedizinischen Gesellschaft e. V. Fachgruppe Verhaltensforschung, Freiburg-Breisgau*, Kuratorium für Technik und Bauwesen in der Landwirtschaft (KTBL): Darmstadt; Germany. Vol. 403, p. 145-152.

Descriptors: castration, urban areas, vermin, vertebrate pests.

Koltveit, A.J. (1991). **Pet overpopulation.** *Journal of the American Veterinary Medical Association* 198(7): 1151-1243. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: overpopulation, pets, companion animals, USA, Europe, veterinary ethics, control laws and enforcement, animal shelters, euthanasia, spaying, neutering, effects of gonadectomy on growth and behavior, termination of pregnancy, epidemiological surveys.

Koltveit, A.J. (1973). **Toward more responsible pet ownership.** *Journal of the American Veterinary Medical Association* 162(6): 434 passim. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, cats, dogs, veterinary legislation, population control, reproductive sterilization, veterinary medicine, United States.

Kuehn, B.M. (2002). **Pros, cons of feral and free-ranging cat management debated.** *Journal of the American Veterinary Medical Association* 221(6): 759, 761-2. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, castration, cat diseases, predatory behavior, veterinarians, zoonoses.

Lane, D.M. (1998). **Solution to pet overpopulation may involve change in perspective.** *Journal of the American Veterinary Medical Association* 213(1): 26. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, cats, population density, sexual behavior, reproductive sterilization.

Lein, D.H. (1978). **Small animal reproductive problems.** *Cornell Veterinarian* 68(Suppl 7): 261-267. ISSN: 0010-8901.

Abstract: Reproductive problems in the dog and cat are an important segment of the total case load in many veterinary practices. The interest in pet population control, estrus control,

artificial insemination and planned pregnancies of pets as well as the advanced knowledge and technology in immunology, microbiology, pathology, physiology and related sciences are expanding the knowledge concerning pet reproduction. The use of radioimmunoassays (RIA) to detect minute amounts of hormones in the serum or plasma of animals has given the physiologist a precise biological measuring stick. As hormone testing laboratories become available, the RIA will become a valuable aide to the veterinary clinician, clients and their pets in diagnosing and possibly preventing or treating reproductive disorders. Knowledge of the normal canine and feline reproductive physiology, pathogenesis of reproductive disorders and a thorough history, genital tract examination, collection and examination of specimens for diagnosis and realistic treatments are all fundamental to a successful management of these disorders.

Descriptors: animals, cats, dogs, pregnancy, reproduction.

Levy, J. (2002). **Feral cats: controversies and controls.** In: *Proceedings of the North American Veterinary Conference: Small Animal and Exotics, Orlando, FL*, Eastern States Veterinary Conference: Gainesville, FL, Vol. 16, p. 417-420.

NAL Call Number: SF605.N672

Descriptors: cats, stray animals, overpopulation, population control, sterilization.

Levy, J.K., D.W. Gale, and L.A. Gale (2003). **Evaluation of the effect of a long-term trap-neuter-return and adoption program on a free-roaming cat population.** *Journal of the American Veterinary Medical Association* 222(1): 42-46. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To evaluate the effect of a long-term trap-neuter-return program, with adoption whenever possible, on the dynamics of a free-roaming cat population. DESIGN: Observational epidemiologic study. ANIMALS: 155 unowned free-roaming cats. PROCEDURES: Free-roaming cats residing on a university campus were trapped, neutered, and returned to the environment or adopted over an 11-year period. RESULTS: During the observation period (January 1991 to April 2002), 75% of the cats were feral, and 25% were socialized. Kittens comprised 56% of the original population. Male cats were slightly more numerous (55%) than females. At the conclusion of the observation period, 47% of the cats had been removed for adoption, 15% remained on site, 15% had disappeared, 11% were euthanatized, 6% had died, and 6% had moved to the surrounding wooded environment. Trapping began in 1991; however, a complete census of cats was not completed until 1996, at which time 68 cats resided on site. At completion of the study in 2002, the population had decreased by 66%, from 68 to 23 cats (of which 22 were feral). No kittens were observed on site after 1995, but additional stray or abandoned cats continued to become resident. New arrivals were neutered or adopted before they could reproduce. CONCLUSIONS AND CLINICAL RELEVANCE: A comprehensive long-term program of neutering followed by adoption or return to the resident colony can result in reduction of free-roaming cat populations in urban areas.

Descriptors: trap-neuter-return programs, feral cat populations, castration, population control, population dynamics, euthanasia, adoption.

- Levy, J.K. (2002). **Final letters for now on feral cats.** *Journal of the American Veterinary Medical Association* 221(11): 1547. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: animal care, pest assessment, euthanasia, neutering, animal shelters, free roaming population, human-animal bond, pet adoption, trap-neuter-return program.
- Lieberman, L.L. (1991). **Retirement brings strong voice to pet overpopulation issue.** *Journal of the American Veterinary Medical Association* 198(7): 1132-1139. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: animals, autobiography, food inspection, history of medicine, population control, portraits, United States, veterinary medicine, veterinary service.
- Lillich, R.K. (2000). **More on ear cropping and neutering.** *Journal of the American Veterinary Medical Association* 216(2): 174-175. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: age factors, animal welfare, castration, cats, dogs, female, male, population control.
- Lord, L.K., T.E. Wittum, C.A. Neer, and J.C. Gordon (1998). **Demographic and needs assessment survey of animal care and control agencies.** *Journal of the American Veterinary Medical Association* 213(4): 483-487. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: legislation, questionnaires, vaccination, veterinary services, wildlife, animal welfare, cats, dogs.
- Mahlow, J.C. and M.R. Slater (1996). **Current issues in the control of stray and feral cats.** *Journal of the American Veterinary Medical Association* 209(12): 2016-2020. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: animal welfare legislation, human-animal bond, cats, euthanasia, female, population control, population density, sterilization.
- McDonald, M. (1980). **Contraceptives for feral cats.** *The Veterinary Record* 106(18-20): 418. ISSN: 0042-4900.
NAL Call Number: 41.8 V641
Descriptors: animal population groups, feral cats, oral contraceptives, population control, poisoning.
- Miller, R.M. (1971). **The pet population explosion: where do we stand?** *Veterinary Medicine: Small Animal Clinician* 66(12): 1152. ISSN: 0042-4889.
NAL Call Number: 41.8 M69
Descriptors: cats, dogs, population control, reproduction, United States.
- Moulton, C., P. Wright, and K. Rindy (1991). **The role of animal shelters in controlling pet overpopulation.** *Journal of the American Veterinary Medical Association* 198(7): 1172-1176. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3

Descriptors: adoption, animal welfare, euthanasia, dogs, cats, orchiectomy, nonprofit organizations, pet population control, United States.

Nassar, R. and J. Fluke (1991). **Pet population dynamics and community planning for animal welfare and animal control.** *Journal of the American Veterinary Medical Association* 198(7): 1160-1164. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, cats, dogs, veterinary euthanasia, statistical models, population control, population dynamics.

Neidhart, L. and R. Boyd (2002). **Companion animal adoption study.** *Journal of Applied Animal Welfare Science* 5(3): 175-192. ISSN: 1088-8705.

NAL Call Number: HV4701.J68

Descriptors: behavior, philosophy and ethics, neutering, spaying, clinical techniques, therapeutic and prophylactic techniques, adopt-a-thon, age differences, animal shelter, companion animal adoption, compatibility, counseling, education health, mortality, personality, pet retention, veterinary care.

Neville, P.F. and J. Remfry (1984). **Effect of neutering on two groups of feral cats.** *The Veterinary Record* 114(18): 447-450. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: Two colonies of urban feral cats were subjected to a programme of population control by trapping, neutering and returning to site. The behaviour of individual cats and the stability of the groups was studied before and after the programme, which was then assessed in terms of its humaneness and effectiveness as a means of control. The method was satisfactory on both counts and may be recommended for controlling feral cat colonies where the welfare of the cats can be assured after their return.

Descriptors: animal behavior, castration, cats, feeding behavior, social behavior, physical restraint, population control.

Olson, P.N. (2000). **Controlling pet overpopulation: new studies shed new light; new sterilants being developed.** In: *Proceedings of the North American Veterinary Conference: Small Animal and Exotics Edition, Orlando, FL*, Eastern States Veterinary Association: Gainesville, FL, Vol. 14, p. 656.

NAL Call Number: SF605.N672

Descriptors: companion animal surplus, National Council on Pet Population Study and Policy, research, age of relinquishment, shelter survey.

Olson, P.N. and S.D. Johnston (1993). **Animal welfare forum: Overpopulation of unwanted dogs and cats. New developments in small animal population control.** *Journal of the American Veterinary Medical Association* 202(6): 904-909. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: induced abortion, cats, contraceptive trends, dogs, population control.

- Olson, P.N. and C. Moulton (1993). **Pet (dog and cat) overpopulation in the United States.** *Journal of Reproduction and Fertility Supplement* 47: 433-438. ISSN: 0449-3087.
NAL Call Number: 442.8 J8222 Suppl.
Abstract: Over half of all United States (US) households own a dog or cat. The veterinary profession can now provide health care for dogs and cats of affluent or devoted owners that rivals the health care offered many human patients. Unfortunately, as many pets receive medical and surgical care that becomes increasingly sophisticated, other pets in the US receive no veterinary care at all. Additionally, millions of pets are humanely killed in US animal shelters because owners are not committed to the continual responsibilities of pet care. Although the total dog and cat population is unknown in the US, as is the total number of pets killed, estimates suggest that between one-tenth and one-quarter of the entire US pet population is destroyed annually because of a surplus dog and cat problem. Pet overpopulation is attributable to relinquishment and abandonment, as well as to birth rates; thus, veterinarians must strive to reduce pet overpopulation by not only curbing reproduction, but also by decreasing the major cause of pet death in the US (i.e. humane killing). Thus, the veterinary profession must take a prominent role in the campaign to prevent the deaths of healthy animals for whom homes cannot be found, just as it has done to prevent the deaths of sick animals that do have homes.
Descriptors: animal rights, domestic animals, cats, dogs, contraception, population control, population density, reproductive sterilization.
- Olson, P.N., C. Moulton, T.M. Nett, and M.D. Salman (1991). **Pet overpopulation: a challenge for companion animal veterinarians in the 1990s.** *Journal of the American Veterinary Medical Association* 198(7): 1151-1152. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: domestic animals, population control, population density, veterinary medicine trends.
- Olson, P.N., T.M. Nett, R.A. Bowen, R.P. Amann, H.R. Sawyer, T.A. Gorell, G.D. Niswender, B.W. Pickett, and R.D. Phemister (1986). **A need for sterilization, contraceptives, and abortifacients: abandoned and unwanted pets. I. Current methods of sterilizing pets.** *Compendium on Continuing Education for the Practicing Veterinarian* 8(2): 87-90,92. ISSN: 0193-1903.
NAL Call Number: SF601.C66
Descriptors: contraception, pet overpopulation, ovariectomy, castration, dogs, cast, abortion
- Patronek, G.J., A.M. Beck, and L.T. Glickman (1997). **Dynamics of dog and cat populations in a community.** *Journal of the American Veterinary Medical Association* 210(5): 637-642. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Abstract: OBJECTIVE: To describe dynamics of the pet dog and cat populations in a single community in terms of reproductive patterns and turnover. DESIGN: Cross-sectional, random-digit dial telephone survey. SAMPLE POPULATION: Information gathered from 1,272 households in St Joseph County, Ind that owned a dog or cat between Dec 1, 1993 and Nov 30, 1994 was compared with data on 9,571 dogs and cats received by the Humane

Society of St Joseph County during the same period. **RESULTS:** Prevalence of pet ownership was lower than expected, compared with consumer panel surveys. Eight hundred forty-three of 1,335 (63.1%) dogs were neutered, compared with 816 of 1,023 (79.8%) cats. Cost was cited as a reason that 35 of 441 (7.9%) dogs and 34 of 132 (25.8%) cats were not neutered. Only 33 of 968 (3.4%) dog-owning households reported that their dog had had a litter during the past year, whereas 52 of 662 (7.9%) cat-owning households reported their cat had had a litter of kittens. Most cat litters were unplanned, whereas two thirds of dog litters were planned. Annual turnover in owned pets was 191 of 1,354 (14.1%) dogs and 194 of 1,056 (18.4%) cats. Pet owners underreported relinquishing pets to a shelter in the telephone survey. **CLINICAL IMPLICATIONS:** A combination of animal shelter- and human population-based data are needed to describe pet population dynamics in a community. Information about species-specific reproductive patterns is essential in designing population control programs.

Descriptors: animal welfare, animals, breeding, castration, cats, data collection, dogs, income, population dynamics.

Reed, D. (1986). **Pet overpopulation: more spay/neuter efforts underway.** *Shelter Sense* 9(5): 1-2, 11-15. ISSN: 0734-3078.

NAL Call Number: HV4701.S43

Descriptors: cat, animals, pets, population control, spaying.

Reed, D. (1986). **Pet overpopulation: spay/neuter efforts continue to reduce animal births.** *Shelter Sense* 9(3): 1-2, 11-15. ISSN: 0734-3078.

NAL Call Number: HV4701.S43

Descriptors: dogs, animal welfare, pet animals, population control, spaying.

Rowan, A.N. (1991). **What we need to learn from epidemiologic surveys pertaining to pet overpopulation.** *Journal of the American Veterinary Medical Association* 198(7): 1233-1236. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, demography, epidemiologic methods, population control, population density, United States.

Rowan, A.N. and J. Williams (1987). **The success of companion animal management programs: a review.** *Anthrozoos* 1(2): 110-122. ISSN: 0892-7936.

NAL Call Number: SF411.A57

Descriptors: dogs, cat, shelter, population control, spaying, animal husbandry, programs, surveys, United States, neuter program.

Samuelson, M.L. (1973). **Spay clinics and pet population control.** *Journal of the American Veterinary Medical Association* 162(12): 1061-1064. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, castration, cats, costs and cost analysis, dogs, fees and charges, legislation, population control, veterinary medicine.

Scarlett, J.M., M.D. Salman, J.G. New, and P.H. Kass (2002). **The role of veterinary practitioners in reducing dog and cat relinquishments and euthanasias.** *Journal of the American Veterinary Medical Association* 220(3): 306-311. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: veterinarians, roles, dogs, cats, euthanasia, behavior problems, counseling, gonadectomy.

Scott, K.C., J.K. Levy, and P.C. Crawford (2002). **Characteristics of free-roaming cats evaluated in a trap-neuter-return program.** *Journal of the American Veterinary Medical Association* 221(8): 1136-1138. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: OBJECTIVE: To determine characteristics of free-roaming cats evaluated in a trap-neuter-return program. DESIGN: Cross-sectional study. ANIMALS: 5,323 free-roaming cats. PROCEDURE: Data collected included sex, maturity, pregnancy status, number of fetuses per pregnancy, cryptorchidism, and occurrence of complications or euthanasia. RESULTS: Adult cats represented 85% of the population, and 57% were female. Overall, 19% of adult females were pregnant, and mean litter size was 3.6 fetuses. Pregnancy rate peaked at 36 to 47% of all females evaluated in March and April and decreased to < or = 4% from October through January. Cryptorchidism was observed in 1.9% of the males; 0.4% of the adult females had pyometra. Only 1.9% of the cats were already neutered. Euthanasia and unexpected death rates were 0.4 and 0.3%, respectively. The most common severe problems encountered included pyometra, neoplasia, surgical complications, diaphragmatic hernia, debilitation, and chronic inflammatory diseases. CONCLUSIONS AND CLINICAL RELEVANCE: Neutering programs for free-roaming cats should include preparations to perform more spays than castrations. Typically, almost half of the female cats trapped during spring will be pregnant. Cryptorchidism is uncommon but is encountered on a consistent basis, so care should be taken to differentiate previous castration from retained testicles. Euthanasia of debilitated cats for humane reasons is rarely necessary, and unexpected deaths occur at a low rate. It is feasible and safe to neuter large numbers of free-roaming cats in large-scale clinics.

Descriptors: trap-neuter-return program, cats, pregnancy rate, castration, neutering program, cryptorchidism, population control, euthanasia, spay-neuter clinics.

Selby, L.A., J.D. Rhoades, J.E. Hewett, and J.A. Irvin (1979). **A survey of attitudes toward responsible pet ownership.** *Public Health Rep* 94(4): 380-386. ISSN: 0033-3549.

Abstract: The concerns of medical and community officials about responsible pet ownership have increased. Before a practical solution can be found for irresponsible ownership and community health problems associated with pet populations, the public's attitudes on issues related to responsible pet ownership must be determined. Such issues include attitudes on dog and cat overpopulation, potential public health problems associated with pet populations, and methods of controlling pet populations and stray animals. Responses to a questionnaire were used to evaluate the attitudes of 910 pet owners and nonowners toward factors comprising responsible pet ownership. The median age of the respondents was 33 years; 414 (45 percent) were men, and 496 (55 percent) were women. At the time of the study, 18 percent owned a cat and a dog, 35 percent owned only a dog, 11 percent showed

only a cat, and 36 percent were nonowners. Not only the sex of the respondent but also the category of pet ownership affected opinions on overpopulation of dogs and cats, nuisance and pollution problems associated with these animals, and methods of controlling pet populations in the community. For example, owners agreed strongly on family planning for pets, but a majority of male owners stated that they would not have their dogs neutered.

Descriptors: adolescent, adult, aged, attitude, child, female, health, human, legislation, male, middle aged, population control, social responsibility.

Sleeman, J.M. (2003). **Additional input on feral cat debate.** *Journal of the American Veterinary Medical Association* 223(12): 1729-1730; author reply 1730. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: domestic animals, human-pet bonding, cats, female, male, pest control, population control methods.

Sorich, T.J. (1976). **Reduced cost for surgical-neutering programs.** In: *Proceedings of the National Conference on Dog and Cat Control, Denver, CO*, American Humane Association: Denver, CO, p. 204-219.

NAL Call Number: SF413.N37 1976

Descriptors: bitches, cat, spaying, surgery, programs, costs, cost-benefit analysis, USA.

Stockner, P.K. (1991). **The economics of spaying and neutering: market forces and owners' values affecting pet population control.** *Journal of the American Veterinary Medical Association* 198(7): 1180-1182. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animals, cats, costs and cost analysis, dogs, female, male, orchietomy, ovariectomy, population control, veterinary medicine economics.

Storts, C.M. (2003). **Discussions on TNR programs continue.** *Journal of the American Veterinary Medical Association* 222(6): 710; 712. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: wildlife management, euthanasia, animal population control, public health risk, trap-neuter-return programs, wildlife losses.

Thornton, G.W. (1992). **The welfare of excess animals: status and needs.** *Journal of the American Veterinary Medical Association* 200(5): 660-662. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal welfare, cats, dogs, euthanasia, female, hysterectomy, male, orchietomy, ovariectomy, population control, population density.

Universities Federation for Animal Welfare (1981). **Feral cats: notes for veterinary surgeons.** *The Veterinary Record* 108(14): 301-303. ISSN: 0042-4900.

NAL Call Number: 41.8 V641

Abstract: Feral cats are usually difficult to handle. In order to neuter or treat them they should be trapped and immobilised by injection of an agent such as ketamine. This is easier to do if the cat is in a squeeze-back container. Once immobilised, clinical examination,

general anaesthesia or euthanasia are straightforward. If the cat is to be ovariohysterectomised, absorbable suture materials and long-acting antibiotics should be used so that recapture will be unnecessary. In colony control schemes all cats left on site should be neutered, marked for identification, vaccinated against feline infectious enteritis with a single dose live vaccine and wormed regularly.

Descriptors: anesthesia, animals, cats, immobilization, euthanasia, veterinary surgery, ovariohysterectomy, neutering.

Weissinger, J. and D. McRae (1991). **FDA fast-tracking of pet population control drugs.** *Journal of the American Veterinary Medical Association* 198(7): 1231-1233. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Abstract: Theriogenologists have been studying estrus prevention and termination of pregnancy in dogs for at least 2 decades. However, drugs approved for estrus suppression are few. No dog or cat abortifacients or male dog and cat sterilants have been approved. Marketed drugs with alternate indications that have antiestrus and antihormonal activity might be good candidates for study after obtaining an INAD from FDA. With the support of the original drug sponsor or manufacturer and appropriate safety and effectiveness studies, these products may be studied for additional label claims. New (not previously approved) drugs additionally need detailed information regarding the synthesis and manufacturing controls. Drugs offering substantial benefit over existing therapeutics may be eligible for expedited review. Prior to starting any studies in this area, clinical investigators and sponsors should communicate with FDA, an INAD must be granted, and the protocol submitted for evaluation. Approvability is evaluated after establishment of safety and effectiveness in clinical field trials.

Descriptors: abortifacient agents, cats, dogs, drug and narcotic control, estrus, female, population control, United States Food and Drug Administration.

Williams, B.A. (2002). **Final letters for now on feral cats.** *Journal of the American Veterinary Medical Association* 221(11): 1547-1548. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal care, pest assessment, euthanasia, neutering, population growth, population reduction, resource competition, trap-neuter-return program.

Williams, J.L. (1988). **Successful spay and neuter programs across the U.S.** *Shelter Sense* 11(5): 7-9. ISSN: 0734-3078.

NAL Call Number: HV4701.S43

Descriptors: dogs, cat, animal welfare, population control, spaying, programs, USA.

Wolff, E.E. (2002). **Final letters for now on feral cats.** *Journal of the American Veterinary Medical Association* 221(11): 1548. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: animal care, pest assessment, euthanasia, neutering, long term population reduction, trap-neuter-return programs.

Young, W.A. (1980). **The surplus animal problem can be solved.** *Modern Veterinary Practice* 61(6): 485-487. ISSN: 0362-8140.

NAL Call Number: 41.8 N812

Descriptors: cats, dogs, population control, population growth.

Zaunbrecher, K.I. and R.E. Smith (1993). **Neutering of feral cats as an alternative to eradication programs.** *Journal of the American Veterinary Medical Association* 203(3): 449-452. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: cats, wild animals, population control, castration, ovarioectomy, costs, ovariohysterectomy.

Wildlife Contraception

Anonymous (1998). **Cunning contraceptives.** *Ecos* (Apr-Jun): 21-24. ISSN: 0143-9073.

Descriptors: CSIRO, vaccines, contraception, wild animals, vertebrate pests, introduced species, baits, vectors, Australia.

Aguilar, R.F., S.K. Mikota, J. Smith, L. Munson, L.J. Freeman, and R. Kolata (1997). **Endoscopic ovariohysterectomy in two lions (*Panthera leo*).** *Journal of Zoo and Wildlife Medicine* 28(3): 290-297. ISSN: 1042-7260.

NAL Call Number: SF601.J6

Abstract: Endoscopic techniques were used to ovariohysterectomize two hybrid Asian lions (*Panthera leo*) in order to reduce the risk of postoperative wound complications associated with standard surgical techniques. One of the lions was aged, overweight, and considered an anesthetic risk. The animals were anesthetized, intubated, catheterized intravenously, and placed in dorsal recumbency with the head lower (Trendelenburg position). Ventilation was assisted mechanically. Following abdominal insufflation, a surgical trocar was placed in the abdominal cavity. Two additional 12-mm surgical trocars were placed under direct visualization using a videoscope. The ovaries and uterus were removed endoscopically, and the abdominal cavity was inspected for hemorrhage under decreased insufflation pressure before closure. The surgery was complicated by obesity, by uterine enlargement from cystic endometrial hyperplasia and endometrial polyps, and by ovarian enlargement and fragility because of bilateral cystic rete ovarii. The procedure and anesthetic recovery were uneventful. Postsurgical recovery time and convalescence lasted less than 3 days, and the animals were reintroduced to an exhibit mate and placed on exhibit within 8 days. The technique is appropriate for use in lions, even those with pathologic reproductive changes, in zoos.

Descriptors: endoscopy, female, hysterectomy, lions, surgery, ovariectomy, surgery of the ovary and uterus, postoperative complications, risk factors, surgical wound infection, time factors.

Artois, M. (1997). **Managing problem wildlife in the 'Old World': a veterinary perspective.** *Reproduction, Fertility, and Development* 9(1): 17-25. ISSN: 1031-3613.

NAL Call Number: QP251.R47

Abstract: This paper focuses on mammalian pest species mainly in Europe and Africa and on implications for animal health, human safety, wildlife management and animal welfare. Three examples of problem species are presented: the wild boar (*Sus scrofa*), the stray dog (*Canis familiaris*) and the red fox, (*Vulpes vulpes*). Several species are reservoirs or vectors of transmissible diseases of man and of economically valuable domestic species. The control of these and other infections and the limitation of the nuisance or damage caused by these pest species involves lethal or non-lethal methods which are briefly reviewed. Some control measures require veterinary expertise, and veterinary involvement in managing problem species is likely to increase. With regard to fertility control, methods are considered which will allow an appropriate choice of the best technique for the management of problem animals in various

habitats. For desirable native species, traditional methods of control, especially hunting in the case of game species, is preferable to contraception. For exotic or feral species, control of fertility seems to be a worthwhile option.

Descriptors: Africa, animal welfare, animals, disease reservoirs, dogs, Europe, foxes, pest control, swine, veterinary medicine.

Asa, C.S., L.J.D. Zaneveld, L. Munson, M. Callahan, and A.P. Byers (1996). **Efficacy, safety, and reversibility of a bisdiazine male-directed oral contraceptive in gray wolves (*Canis lupus*)**. *Journal of Zoo and Wildlife Medicine* 27(4): 501-506. ISSN: 1042-7260.

NAL Call Number: SF601.J6

Descriptors: contraception, oral contraceptive, bisdiazine, safety, zoo animals, spermatogenesis, contraceptives, wolves, infertility, dosage

Bertschinger, H.J., C.S. Asa, P.P. Calle, J.A. Long, K. Bauman, K. DeMatteo, W. Jochle, T.E. Trigg, and A. Human (2001). **Control of reproduction and sex related behaviour in exotic wild carnivores with the GnRH analogue deslorelin: preliminary observations**. *Journal of Reproduction and Fertility Supplement* 57: 275-283. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: The GnRH analogue deslorelin, in long-acting implants, was used in an attempt to temporarily control reproduction or aggression in wild carnivores in southern Africa and the USA. In the southern African study, 6 mg deslorelin was administered to cheetahs (eight females, four males), one female leopard and wild dogs (six females, one male) housed in groups, and 12 mg deslorelin was administered to two lionesses. None of the animals became pregnant after deslorelin administration apart from one wild dog that was mated at the initial treatment-induced oestrus. Two wild dogs and one lioness came into oestrus 12 and 18 months after deslorelin administration, respectively, thus demonstrating that the anti-fertility effects of deslorelin are reversible. Two lionesses and four cheetahs underwent oestrus without allowing mating 2-14 days after treatment. Simultaneous administration of progestins to three bitches and one lioness did not suppress oestrus. Male cheetahs had no spermatozoa on day 82 after treatment and did not impregnate two untreated females. Of three untreated female wild dogs housed with treated males, only the first female to enter oestrus (21 days after deslorelin administration) became pregnant. One month after treatment, plasma testosterone concentrations of male dogs were at basal values. In the USA study, three male sea otters that had been treated with 6 mg deslorelin ceased antagonistic behaviour and blood testosterone concentrations and size of the testes were still sharply reduced 24 months after treatment. Male red (n = 7) and grey (n = 5) wolves received 6 mg deslorelin in December 1998 but no effects on seasonal spermatogenesis and behaviour were observed. In a black-footed cat, sperm production, libido and aggressiveness decreased in response to treatment with 3 mg deslorelin and penile spines were not observed within 3 months after treatment, but were observed again 4-6 months later. Treatment of female red (n = 5) and grey (n = 5) wolves with deslorelin in December 1999 triggered pre-season oestrus and mating, which were followed by one abortion and one successful pregnancy. Contraception was achieved in female Fennec foxes (n = 7) and two lionesses, which was observed in the foxes by an absence of increases in faecal progesterone concentrations. In two male bush dogs, administration of

3 mg deslorelin once or twice was insufficient to suppress reproductive function or behaviour. **Descriptors:** wild animals, carnivores, cheetahs, contraception, drug implants, foxes, gonadorelin, lions, otters, progesterone, sexual behavior, spermatogenesis, testosterone, triptorelin.

Bertschinger, H.J., T.E. Trigg, W. Jochle, and A. Human (2002). **Induction of contraception in some African wild carnivores by downregulation of LH and FSH secretion using the GnRH analogue deslorelin.** *Reproduction* 60(Suppl.): 41-52. ISSN: 1477-0415.

NAL Call Number: QP251.J75 Suppl.

Abstract: The GnRH analogue deslorelin, in long-acting biocompatible implants, was used as a contraceptive in 31 cheetahs (13 females and 18 males), 21 African wild dogs (15 females and 6 males), 10 lionesses and four leopards (three females and one male). A dose of 12 or 15 mg deslorelin was administered to lions, whereas 6 mg deslorelin was administered to the other species. Monitoring consisted of observations, measurement of plasma progesterone and testosterone concentrations, vaginal cytology and evaluation of semen and sex organs. Deslorelin induced contraception in lionesses for 12-18 months, and in female cheetahs and leopards for a minimum of 12 months after treatment. Two male cheetahs had no viable spermatozoa or detectable plasma testosterone 21 months after treatment with deslorelin. Female wild dogs responded less consistently and one bitch conceived 4 weeks after implantation. However, in nine bitches, mating could be postponed until the next breeding season. Male dogs responded consistently and the contraception was effective for approximately 12 months. Although lionesses and cheetahs may become attractive to males for a few days after treatment, mating was not observed. No side-effects or behavioural changes were noted, indicating that deslorelin is a safe drug to use for the contraception of the species described. Males remain fertile for the first 6 weeks after the insertion of implants and should be separated from cyclic females during this period.

Descriptors: Africa, animals, zoos, carnivores, cheetahs, contraception, veterinary, dogs, drug implants, enzyme inhibitors, follicle stimulating hormone, lions, luteinizing hormone, progesterone, sperm count, testosterone, triptorelin.

Bradley, M.P. (1994). **Experimental strategies for the development of an immunocontraceptive vaccine for the European red fox, *Vulpes vulpes*.** *Reproduction, Fertility, and Development* 6(3): 307-317. ISSN: 1031-3613.

NAL Call Number: QP251.R47

Abstract: The development of an immunocontraceptive vaccine to control fox populations in Australia would confer considerable advantages in controlling the long-term impact of this predator on native and endangered species. Studies are currently under way to identify sperm antigens that might be used in such a vaccine, and some of these studies are described. It is proposed that such a vaccine would be delivered orally in a bait, thereby stimulating a mucosal immune response to the foreign antigen(s). Such a vaccine requires a detailed understanding of reproductive-tract mucosal immunity in foxes, and selection of the most effective form of antigen delivery. Those under consideration include viral or bacterial vectors and microencapsulated antigens.

Descriptors: antibody formation, administration and dosage of antigens, immunologic contraception, foxes, vaccines.

Bradley, M.P., L.A. Hinds, and P.H. Bird (1997). **A bait-delivered immunocontraceptive vaccine for the European red fox (*Vulpes vulpes*) by the year 2002?** *Reproduction, Fertility, and Development* 9(1): 111-116. ISSN: 1031-3613.

NAL Call Number: QP251.R47

Abstract: An orally-delivered immunocontraceptive vaccine is being developed for the control of fox populations. A number of genes (PH-20, LDH-C4, ZP3) encoding gamete proteins have been cloned, produced in recombinant expression systems and used in fertility trials to test the efficacy of these antigens. As the immunocontraceptive vaccine will be delivered in a bait, there is a requirement for a greater understanding of the immune responses of the reproductive mucosa in canids, and the assessment of the best vaccine delivery system that will evoke a mucosal antibody response. Several vaccine delivery systems including microencapsulated antigens, and both vaccinia virus and bacterial vectors are being investigated. Oral administration of *Salmonella typhimurium* recombinants expressing different fox sperm antigens stimulates both systemic IgG responses to the antigen and a mucosal immune response within the female reproductive tract in the fox, indicating that salmonella may have potential with respect to the oral delivery of antigen. The enhancement of mucosal immune responses to orally-delivered vaccines is also being examined, research focussing on the possible use of fox-specific cytokines or the beta-subunit of cholera toxin in forming part of the vaccine construct.

Descriptors: immunologic adjuvants, amino acid sequence, antigens, Australia, contraception, foxes, food, molecular sequence data, methods of pest control, vaccines.

De, J.J., P.H. Bird, N.K. Verma, and M.P. Bradley (1999). **Antigen-specific systemic and reproductive tract antibodies in foxes immunized with salmonella typhimurium expressing bacterial and sperm proteins.** *Reproduction Fertility and Development* 11(4-5): 219-228. ISSN: 1031-3613.

Descriptors: oral immunocontraceptive vaccine, foxes, wildlife management, *Escherichia coli*, *Salmonella*.

De, J.J., L.a. Hinds, and M.P. Bradley (1997). **Regulation of reproductive tract immunoglobulins by oestradiol-17beta in the european red fox (*Vulpes vulpes*).** *Reproduction Fertility and Development* 9(5): 531-538. ISSN: 1031-3613.

Descriptors: immunocontraceptive vaccine, foxes, reproductive tract immunity, Peyer's patch immunization, *Salmonella*, oestradiol-17beta, female.

DeLiberto, T.J., A. Seglund, W. Jochle, and B. Kimball (2002). **Assessment of cabergoline as a reproductive inhibitor in coyotes (*Canis latrans*).** *Reproduction* 60(Suppl.): 53-64. ISSN: 1477-0415.

Abstract: The efficacy of three oral formulations (gelatin capsule, tablet, oil base) and five dosages (50, 100, 250, 500, 1000 microg) of cabergoline to disrupt reproduction in coyotes (*Canis latrans*) was evaluated. The type of formulation used had no effect on plasma progesterone and prolactin concentrations or on mean litter size. No adverse side effects (for example, vomiting, anorexia, diarrhoea) were observed despite the use of doses of up to 20 times the therapeutic dose used for domestic dogs and cats. All coyotes treated with 50, 100,

250 and 500 microg cabergoline whelped, but plasma progesterone concentrations in these coyotes were lower ($P < \text{or} = 0.07$) than in control animals at day 7 after treatment. Ten of 11 females treated with 1000 microg cabergoline whelped, but progesterone concentrations in these coyotes were lower than in control animals up to day 14 after treatment ($P < \text{or} = 0.04$). Dosages of 1000 microg cabergoline decreased blood serum prolactin ($P < \text{or} = 0.10$) and progesterone ($P < \text{or} = 0.06$) concentrations, but apparently failed to decrease progesterone below the threshold necessary to maintain pregnancy in all but one animal. However, progressive inhibition of prolactin and progesterone with increasing doses of cabergoline indicated that higher dosages might be effective in coyotes. Survival of pups born to cabergoline-treated females was not different ($P < 0.001$) from that of pups born to control females, but mean litter size was smaller for females treated with cabergoline ($P < \text{or} = 0.073$) than for the control females. Although all cabergoline treatments in this study were ineffective at preventing reproduction in coyotes, progressive inhibition of prolactin and progesterone with increasing dosages of cabergoline indicates that higher doses might be effective in preventing reproduction in coyotes. However, the physiological differences from other canine species in dopamine D2 receptors and mechanisms of luteal support may ultimately prevent the use of cabergoline for reproductive control in coyotes.

Descriptors: cabergoline, litter size, coyotes, plasma progesterone, dose-response relationship, prevention of reproduction, administration, oral, animals.

Farstad, W. (1998). **Reproduction in foxes: current research and future challenges.** *Animal Reproduction Science* 53(1-4): 35-42. ISSN: 0378-4320.

Descriptors: endocrinology, physiology, artificial insemination, semen, cryopreservation, population control, sterilization, in vitro, *Alopex lagopus*, *Vulpes vulpes*.

George, P.O., C.J. Chandra, S.R. Nayar, C.A. Varkey, and T.P. Balagopalan (1995). **Vasectomy in lions (*Panthera leo*).** *Indian Veterinary Journal* 72(1): 94. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: reproductive system, surgery, wildlife management, breeding, castration, population control.

George, P., C. Chandra, J.V. Cheeran, T.S. Amma, and K. Rajankutty (1995). **Orchiectomy in lions (*Panthera leo*).** *Indian Veterinary Journal* 72(1): 92-93. ISSN: 0019-6479.

NAL Call Number: 41.8 IN2

Descriptors: Felidae, reproductive techniques, testis, orchiectomy, case report.

Grandy, J.W. and A.T. Rutberg (2002). **An animal welfare view of wildlife contraception.** *Reproduction Supplement* 60: 1-7. ISSN: 1477-0415.

NAL Call Number: QP251.J75 Suppl.

Abstract: Although there is some dissent, the animal protection community generally supports the concept of wildlife contraception. However, some contraceptive agents, delivery mechanisms and specific applications will be opposed by animal welfare advocates on environmental, humane or other ethical grounds, and some animal rights advocates may oppose wildlife contraception entirely. The Humane Society of the United States (HSUS) has supported and conducted wildlife contraception studies for more than 10 years. In general, we

have invested in contraceptive agents (such as porcine zona pellucida) that we believe will prove environmentally, physiologically and behaviourally benign, and in delivery mechanisms that are narrowly targeted. As we consider contraception to be a major intervention into natural processes, we believe that wildlife contraception should be applied judiciously, locally and in a manner that is sensitive to the needs of animals, humans and ecosystem function.

Descriptors: animal welfare, wild animals, carnivora, immunologic contraception, antigens, egg proteins, elephants, deer, horses, membrane glycoproteins, population control.

Haight, R.G. and L.D. Mech (1997). **Computer simulation of vasectomy for wolf control.** *Journal of Wildlife Management* 61(4): 1023-1031. ISSN: 0022-541X.

NAL Call Number: 410 J827

Descriptors: models, population regulation, wildlife management, sterilization, *Canis lupus*, gray wolf, computer applications.

Holland, M.K. (1999). **Fertility control in wild populations of animals.** *Journal of Andrology* 20(5): 579-585. ISSN: 0196-3635.

Descriptors: wildlife management, feral animals, fertility control, habitat destruction, immunocontraception, population management, resource availability, vaccine development

Holland, M.K. and A.J. Robinson (1995). **The use of viral vectored immunocontraception for feral pest control in Australia.** In: *Proceedings of a Joint Conference American Association of Zoo Veterinarians, Wildlife Disease Association, and American Association of Wildlife Veterinarians, East Lansing, Michigan, USA, AAZV (AAWV (and WDA, 810 East 10th Street, Lawrence, Kansas 66044, USA)),* p. 43-55.

Descriptors: ecology, immune system, infection, wildlife management.

Hood, G.M., P. Chesson, and R.P. Pech (2000). **Biological control using sterilizing viruses: host suppression and competition between viruses in non-spatial models.** *Journal of Applied Ecology* 37(6): 914-925. ISSN: 0021-8901.

Descriptors: wildlife management, myxomatosis, viral infection, sterilization, pest control method, viral vectored immunocontraception, contraception method, non spatial models.

Johnson, P. Jr and D. Baffa (1979). **Use of megestrol acetate in African lions (*Panthera leo*).** *Veterinary Medicine: Small Animal Clinician* 74(10): 1542-1544. ISSN: 0042-4889.

NAL Call Number: 41.8 M69

Descriptors: aggression, contraception, female, human, lions, megestrol, pregnancy.

Kazensky, C.A., L. Munson, and U.S. Seal (1998). **The effects of melengestrol acetate on the ovaries of captive wild felids.** *Journal of Zoo and Wildlife Medicine* 29(1): 1-5. ISSN: 1042-7260.

NAL Call Number: SF601.J6

Abstract: Melengestrol acetate (MGA) is the most widely used contraceptive in zoo felids, but the mechanism of contraception and the pathologic effects have not been investigated. For this study, the effects of MGA on folliculogenesis were assessed, and the association of MGA with ovarian lesions was evaluated. Comparisons were made among the histopatho-

logic findings in the ovaries from 88 captive wild felids (representing 15 species) divided into three groups: 37 currently contracepted with MGA, eight previously exposed to MGA, and 43 never contracepted. Ninety-one percent of the felids evaluated had tertiary follicles, and no differences were noted between contracepted and uncontracepted cats. Some MGA-contracepted cats also had corpora lutea indicating recent ovulation. These results indicate that folliculogenesis not suppressed by current doses of MGA and ovulation occurred in some cats. Therefore, the contraceptive actions of MGA do not occur by suppressing folliculogenesis, and MGA-contracepted felids likely have endogenous estrogens that may confound progestin effects on the uterus. Cystic rete ovarii was the most common pathologic finding, but they were not more prevalent in MGA-contracepted cats. These findings indicate that MGA is not associated with ovarian disease, including ovarian cancer, in contrast to the uterine lesions noted in MGA-treated cats.

Descriptors: zoo animals, felids, contraceptive implants, melengestrol acetate, mechanism of contraception, ovarian pathology.

Kirkpatrick, J.F. and A.T. Rutberg (2001). **Fertility control in animals.** In: D.S. Salem and A.N. Rowan (editors), *State of the Animals 2001*, Humane Society Press: Washington, DC, p. 183-198. ISBN: 0-9658942-3-1.

Descriptors: humane control of wildlife, local population size, population control, fertility control, immunocontraception, porcine zona pellucida vaccine, horses, deer, elephants, companion animals, ethics.

Kirkpatrick, J.F., J.W. Turner Jr, I.K. Liu, and R. Fayrer-Hosken (1996). **Applications of pig zona pellucida immunocontraception to wildlife fertility control.** *Journal of Reproduction and Fertility Supplement* 50: 183-189. ISSN: 0449-3087.

NAL Call Number: 442.8 J8222 Suppl.

Abstract: A unique application of pig zona pellucida (PZP) immunocontraception is the control of wildlife populations. A native PZP vaccine has been successfully applied to wild horse and donkey populations. A single annual booster inoculation was capable of maintaining contraception. Seven consecutive years of PZP treatment in wild mares resulted in no detectable debilitating side effects, and reversibility of contraception has been documented among mares treated for up to 4 consecutive years. Long-term treatment (5-7 years) is associated with some ovulation failure and depressed urinary oestrogen concentrations. Complex social behaviours in horses were unaffected by treatment. PZP immunocontraception has also been successfully applied to white-tailed deer, with no detectable changes in ovarian histology after 2 years of treatment. Seventy-four species of captive zoo animals have been treated with the PZP vaccine, with documented success in 27 species, including members of the orders Perissodactyla (Equidae), Artiodactyla (Cervidae, Capridae, Giraffidae, Bovidae), and Carnivora (Ursidae, Mustelidae, Felidae). Immunocytochemistry studies have demonstrated a high degree of crossreactivity between anti-PZP antibodies and African elephant zona pellucida. The need for a one-inoculation form of the vaccine has led to the incorporation of PZP into lactide-glycolide microspheres, which cause a delayed release of the PZP. PZP immunocontraception of wildlife has potential because of (1) > 90% effectiveness, (2) the ability for remote delivery, via darts, (3) reversibility after short-term use, (4) a wide breadth of effectiveness across many species, (5) a lack of debilitating side-effects even after long-term

treatment, and (6) minimal effects upon social behaviours.

Descriptors: zona pellucida immunocontraception, wildlife , population control, reversible contraception.

Kolata, R.J. (2002). **Laparoscopic ovariectomy and hysterectomy on African lions (*Panthera leo*) using the ultracision harmonic scalpel.** *Journal of Zoo and Wildlife Medicine* 33(3): 280-282. ISSN: 1042-7260.

NAL Call Number: SF601.J6

Abstract: Two laparoscopic ovariectomies and three laparoscopic hysterectomies were performed on normal, healthy, adult African lions (*Panthera leo*) in dorsal recumbency, with the body tilted at 25 degrees with the head down. One 12-mm trocar and two 5-mm trocars were used to access the uterus and ovaries, and the UltraCision (Harmonic Scalpels clamp or coagulation shears was used to coagulate and divide the ovarian- and the uterine-supporting structures and the uterine body. The animals recovered uneventfully from anesthesia and were released to their exhibits within 5-10 days of surgery. Such procedures can be performed safely on large felids and can reduce postoperative recovery time and postoperative complications. The scalpel facilitated the procedure by coagulating and dividing tissue in a continuous sequence and reducing the number of instruments required.

Descriptors: hysterectomy, laparoscopy, lions, ovariectomy, ultrasonics.

Kolata, R.J. (2002). **Laparoscopic ovariectomy and hysterectomy on african lions (*Panthera leo*) using the ultracision(r) harmonic scalpel(r).** *Journal of Zoo and Wildlife Medicine* 33(3): 280-282. ISSN: 1042-7260.

NAL Call Number: SF601.J6

Descriptors: devices and instrumentation, reproductive system, surgery, ultracision harmonic scalpel, laparoscopic hysterectomy, lions.

Mccallum, H. (1996). **Immunocontraception for wildlife population control.** *Trends in Ecology and Evolution* 11(12): 491-493. ISSN: 0169-5347.

Descriptors: conservation, wildlife management, bait delivery, Brushtailed possum, contraceptive method, immunocontraception, pest management, vector, wildlife population control.

Munson, L., A. Gardner, R.J. Mason, L.M. Chassy, and U.S. Seal (2002). **Endometrial hyperplasia and mineralization in zoo felids treated with melengestrol acetate contraceptives.** *Veterinary Pathology* 39(4): 419-427. ISSN: 0300-9858.

NAL Call Number: 41.8 P27

Abstract: Melengestrol acetate (MGA) contraceptives are widely used in zoo felids to regulate fertility and may have deleterious effects on endometrial health. To determine whether MGA exposure was associated with endometrial disease, the genital tracts of 212 zoo felids (99 MGA treated and 113 control) representing 23 species were evaluated. Adenomatous and cystic hyperplasia were prevalent in both MGA-treated (85%) and control (61%) groups, and the risk of developing these lesions increased with age. Treatment with MGA further increased the risk of developing advanced hyperplasia regardless of dose, and treatment for >72 months significantly elevated that risk, whereas parous animals had a lower risk. Endo-

metrial polyps, fibrosis, adenomyosis, and hydrometra occurred in both MGA-treated and control animals. MGA treatment was associated with an increased risk of hydrometra and mineralization but not of adenomyosis, polyps, or fibrosis after adjusting for advanced hyperplasia. Acute or chronic endometritis were associated with advanced hyperplasia but not with MGA treatment. These results indicate that proliferative and inflammatory endometrial lesions are common spontaneous diseases in zoo cats, and MGA contraceptives increase the risk of some diseases. The association of MGA with endometrial lesions that could impair fertility should be considered when using this contraceptive in genetically valuable felids.

Descriptors: zoo animals, felids, contraceptive agents, drug implants, melengestrol acetate, endometrial disease, risk factors.

Peacock, T. (2002). **Progress towards immunocontraceptive control of pest animals.** *Proceedings of the Second NSW Pest Animal Control Conference: Practical Pest Animal Management, Dubbo, NSW, Australia*, NSW Agriculture: Orange, NSW, Australia, 59 p.

NAL Call Number: SF140.F47 N782 2002

Abstract: This volume is a pre-conference compilation of working papers, posters and abstracts. The contents are unrefereed and in many cases contain preliminary results only.

Descriptors: contraception, contraceptives, control methods, control programmes, integrated pest management, pest control, vertebrate pests, wild animals, foxes, rabbits.

Robinson, A.J. and M.K. Holland (1995). **Testing the concept of virally vectored immunosterilisation for the control of wild rabbit and fox populations in Australia.** *Australian Veterinary Journal* 72(2): 65-68. ISSN: 0005-0423.

NAL Call Number: 41.8 Au72

Abstract: Virally vectored immunosterilisation is a concept whereby a gene encoding an antigen from an animal's reproductive system is inserted into a virus and, during infection, stimulates the formation of antibodies to that antigen such that the animal is rendered infertile. There is good evidence that certain proteins from sperm or egg when introduced parenterally will induce infertility. This paper summarises the work of the Cooperative Research Centre for the Biological Control of Vertebrate Pest Populations and reviews progress toward the isolation of the genes for gamete antigens from rabbits and foxes and their introduction into suitable viral vectors as a means of control of these pests in Australia.

Descriptors: wild animals, immunologic contraception, foxes, genetic vectors, population control, rabbits, sterilization.

Saunders, G., J. McIlroy, M. Berghout, B. Kay, E. Gifford, R. Perry, and R. van de Ven (2002). **The effects of induced sterility on the territorial behaviour and survival of foxes.** *Journal of Applied Ecology* 39(1): 56-66. ISSN: 0021-8901.

Descriptors: foxes, population control, induced sterility, effects on territoriality and survival, behavior, immunocontraception, Australia.

Thompson, L.H. (1976). **Induced sterility for coyote control: effect of cadmium chloride on potential fertility of the male *Canis familiaris*.** *Science of Biology Journal* 2(2): 42-47. ISSN: 0098-5600.

NAL Call Number: QH301.S335

Descriptors: laboratory animals, cadmium, chemosterilants, spermatogenesis, sterilization.

Thomson, P.C., N.J. Marlow, K. Rose, and N.E. Kok (2000). **The effectiveness of a large-scale baiting campaign and an evaluation of a buffer zone strategy for fox control.** *Wildlife Research* 27(5): 465-472. ISSN: 1035-3712.

Descriptors: pest assessment control and management, population studies, immunocontraception, contraception method, large scale baiting campaign, population reduction.

Tyndale-Biscoe, C.H. (1994). **Virus-vectored immunocontraception of feral mammals.** *Reproduction, Fertility, and Development* 6(3): 281-287. ISSN: 1031-3613.

NAL Call Number: QP251.R47

Abstract: The potential value of immunosterilization as a means to control species of wildlife that are widespread, numerous and undesirable is assessed. Key questions about the efficacy of fertility control and the means for delivering antigens expressed in recombinant viral vectors are discussed and the legal and social concerns that relate to its possible future use are raised.

Descriptors: animals, Australia, bioethics, immunologic contraception, foxes, genetic vectors, population control, rabbits, sterilization.

Teaching Spay-Neuter

- Bauer, M.S. (1993). **A survey of the use of live animals, cadavers, inanimate models, and computers in teaching veterinary surgery.** *Journal of the American Veterinary Medical Association* 203(7): 1047-1051. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: cadaver, computer, model, patient, software, castration, spay, surgery, dog, cat, veterinary medical school.
- Berzon, J.L. (1979). **Complications of elective ovariohysterectomies in the dog and cat at a teaching institution: clinical review of 853 cases.** *Veterinary Surgery* 8(3): 89-91. ISSN: 0161-3499.
NAL Call Number: SF911.V43
Descriptors: intraoperative and postoperative complications, students, elective surgery, ovariohysterectomy.
- Buyukmihci, N.C. (1989). **Alternatives in veterinary surgical training.** *Humane Innovations and Alternatives in Animal Experimentation* 3: 96-97. ISSN: 0893-9535.
NAL Call Number: QL55.H8
Abstract: Practical and philosophical aspects of alternatives to harming or killing healthy nonhuman animals are discussed.
Descriptors: surgery, animals, veterinary medical school.
- Clark, W.T., L. Kane, P.K. Arnold, and I.D. Robertson (2002). **Clinical skills and knowledge used by veterinary graduates during their first year in small animal practice.** *Australian Veterinary Journal* 80(1/2): 37-40. ISSN: 0005-0423.
NAL Call Number: 41.8 Au72
Descriptors: diagnosis, graduates, knowledge, skills, small animal practice, surveys, therapy, veterinarians, veterinary practice.
- Duffee, N. (1999). **Alternative training methods I: Proceedings of the 1998 LAWTE meeting.** *Lab Animal* 28(5): 24-28.
Descriptors: training models, media for training research personnel, simulation models, computer resources, virtual reality.
- Eze, C.A. and O.S. Idowu (2002). **Distribution of surgical cases at the University of Nigeria Veterinary Teaching Hospital (1985-1995).** *Tropical Veterinarian* 20(1): 52-55. ISSN: 0253-4851.
NAL Call Number: SF724.T72
Descriptors: surgery, hernia, digestive system disease, transmissible venereal tumor, infectious disease, neoplastic disease, reproductive system disease, uterine prolapse, abscess, bone fracture, castration, cesarean section.

Greenfield, C.L., A.L. Johnson, D.J. Schaeffer, and L.L. Hungerford (1995). **Comparison of surgical skills of veterinary students training using models or live animals.** *Journal of the American Veterinary Medical Association* 206(12): 1840-1845. ISSN: 0003-1488.

NAL Call Number: 41.8 Am3

Descriptors: surgery, animal model, veterinary medical school, comparison study.

Greenfield, C.L., A.L. Johnson, C.W. Smith, S.M. Marretta, J.A. Farmer, and L. Klippert (1994).

Integrating alternative models into the existing surgical curriculum. *Journal of Veterinary Medical Education* 21(1): 23-27. ISSN: 0748-321X.

Descriptors: training aides, animal models, teaching surgery, animal welfare.

Griffon, D.J., P. Cronin, B. Kirby, and D.F. Cottrell (2000). **Evaluation of a hemostasis model for teaching ovariohysterectomy in veterinary surgery.** *Veterinary Surgery* 29(4): 309-316.

ISSN: 0161-3499.

NAL Call Number: SF911.V43

Abstract: OBJECTIVE: To evaluate the efficacy of a reusable plastic model mimicking the anatomy and hemodynamics of the canine female genital tract for teaching basic surgical skills and ovariohysterectomy. SAMPLE POPULATION: 40 veterinary students of the class of 1998. STUDY DESIGN: Prospective study. METHODS: Students' confidence level and experience in private practice was evaluated via questionnaire before training. Students in 2 groups performed an ovariohysterectomy on cadavers (group C, n = 20) or on the model (Group M, n = 20) for 2 hours. Students' psychomotor and basic surgical skills were objectively assessed by the following tests: ligation of a foam cylinder, passing a needle through the eyelets of an electronic suture board, and ligating latex tubing. Results were compared before and after training and within and between groups. The ability of students to perform an ovariohysterectomy in a live dog after training was compared between groups with a scoring system. RESULTS: Students in both groups had similar surgical experience and basic skills before training. The results of the psychomotor and basic surgical skills tests were better in group M after training than group C. The improvement of each student in performing these tasks also increased when students were trained with the model. Scores assigned to students performing an ovariohysterectomy in a live dog were higher in group M (31.45 +/- 1.15) than in group C (20.7 +/- 1.42). CONCLUSION: The model was more effective than cadavers in teaching basic surgical skills and ovariohysterectomy in dogs.

Descriptors: veterinary education, dogs, ovariohysterectomy, anatomic model, ovariectomy, comparative study.

Howe, L.M., H.W. Boothe, J.R. August, K.L. Bice, and K.L. Medicus (1998). **Using community-based service learning projects to improve surgical instruction.** *Journal of Veterinary Medical Education* 25(2): 12-15. ISSN: 0748-321X.

NAL Call Number: SF601.J62

Descriptors: castration, spay, surgery, cat, dog, veterinary medical school.

- Howe, L.M. and M.R. Slater (1997). **Student assessment of the educational benefits of a prepubertal gonadectomy program (preliminary findings).** *Journal of Veterinary Medical Education* 24(1): 12-17. ISSN: 0748-321X.
NAL Call Number: SF601.J62
Descriptors: assessment, gonadectomy, population control, surgery, sterilization, veterinary education, pets.
- Howe, L. and M. Slater (1999). **Assesment of the educational benefits of a prepubertal gonadectomy program.** *Journal of Veterinary Medical Education* 26(2): 21-27. ISSN: 0748-321X.
NAL Call Number: SF601.J62
Descriptors: assessment, castration, spay, surgery, cat, dog, veterinary medical school.
- Hughes, K.L. and M.R. Slater (2002). **Implementation of a feral cat management program on a university campus.** *Journal of Applied Animal Welfare Science* 5(1): 15-28. ISSN: 0002-9645.
NAL Call Number: 41.8 Am3A
Abstract: In August 1998, Texas AM University implemented on campus a trap-test-vaccinate-alter-return-monitor (TTVARM) program to manage the feral cat population. TTVARM is an internationally recognized term for trapping and neutering programs aimed at management of feral cat populations. In this article we summarize results of the program for the period August 1998 to July 2000. In surgery laboratories, senior veterinary students examined cats that were humanely trapped once a month and tested them for feline leukemia and feline immunodeficiency virus infections, vaccinated, and surgically neutered them. They euthanized cats testing positive for either infectious disease. Volunteers provided food and observed the cats that were returned to their capture sites on campus and maintained in managed colonies. The program placed kittens and tame cats for adoption; cats totaled 158. Of the majority of 158 captured cats, there were less kittens caught in Year 2 than in Year 1. The proportion of tame cats trapped was significantly greater in Year 2 than in Year 1. The prevalence found for feline leukemia and feline immunodeficiency virus ELISA test positives was 5.8% and 6.5%, respectively. Following surgery, 101 cats returned to campus. The project recaptured, retested, and revaccinated more than one-fourth of the cats due for their annual vaccinations. The program placed 32 kittens, juveniles, and tame adults for adoption. The number of cat complaints received by the university's pest control service decreased from Year 1 to Year 2.
Descriptors: feral cat population control, animal welfare, castration, population dynamics, veterinary students, euthanasia, vaccination.
- Kustritz, M.V.R., S.D. Johnston, and L.L. Lieberman (2000). **Availability of training for prepubertal gonadectomy at North American veterinary colleges.** *Journal of the American Veterinary Medical Association* 216(10): 1566-1567. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: gonadectomy, training, veterinary schools, veterinary profession, veterinary education, castration, surgery.

- Mahan, H.D. (1976). **Veterinary association surgical-neutering programs.** *Proceedings of the National Conference on Dog and Cat Control, Denver, Colorado*, American Humane Association: Denver, CO, p. 199-203.
NAL Call Number: SF413.N37 1976
Descriptors: dogs, cat, spaying, surgery, programs, veterinary medicine, organizations, California.
- Pavletic, M.M., A. Schwartz, J. Berg, and D. Knapp (1994). **An assessment of the outcome of the alternative medical and surgical laboratory program at Tufts University.** *Journal of the American Veterinary Medical Association* 205(1): 97-100. ISSN: 0003-1488.
NAL Call Number: 41.8 Am3
Descriptors: cadaver, surgery, veterinary medical school, ovariohysterectomy, castration, laceration, laparotomy, gastrotomy, thoracotomy.
- Richardson, E.F., C.R. Gregory, and E. Sucre (1994). **Enhancement of the surgical education of fourth year veterinary students by participation in juvenile ovariohysterectomy and castration program.** *Veterinary Surgery* 23(5): 415. ISSN: 0161-3499.
NAL Call Number: SF911.V43
Descriptors: postoperative complications, veterinary education, castration, hysterectomy, dogs, cats.
- Tivers, M.S., T.R.D. Travis, R.V. Windsor, and A. Hotston Moore (2002). **Castration of the dog: a comparison of methods currently employed in practice with those taught at the UK veterinary schools.** *Journal of Small Animal Practice* 43(8): 364. ISSN: 0022-4510.
NAL Call Number: 41.8 J8292
Descriptors: castration, veterinary schools, veterinary practice, questionnaire, meeting abstract.
Notes: Clinical research abstract presented at the 45th British Small Animal Veterinary Association Congress, Birmingham, UK, April 4-7, 2002.
- Tivers, M.S., T.R.D. Travis, R.V. Windsor, and A. Hotston Moore (2002). **Ovariohysterectomy in the bitch: a comparison of methods currently employed in practice with those taught at UK veterinary schools.** *The Journal of Small Animal Practice* 43(8): 364.
NAL Call Number: 41.8 J8292
Descriptors: veterinary schools, veterinary medicine, urinary incontinence, questionnaires, castration, ovariohysterectomy, meeting abstract.
Notes: Clinical research abstract presented at the 45th British Small Animal Veterinary Association Congress, Birmingham, UK, April 4-7, 2002.
- White, K.K., L.G. Wheaton, and S.A. Greene (1992). **Curriculum change related to live animal use: A four-year surgical curriculum.** *Journal of Veterinary Medical Education* 19(1): 6-10. ISSN: 0748-321X.
NAL Call Number: SF601.J62
Abstract: This program is located at Washington State University, College of Veterinary

Medicine.

Descriptors: cadaver, anesthesia, assessment, castration, spay, surgery, veterinary medical school.

Audiovisuals

The Animals Are Crying (1973). Learning Corporation of America: New York, NY. 28 min. [16 mm].

NAL Call Number: Motion Picture No. 170

Abstract: Through a visit to an animal shelter and discussions with shelter personnel, a young family becomes aware of dog and cat overpopulation and the urgent need for animal birth control.

Descriptors: pets, dogs, cats, animal shelter, spaying, population control.

Canine Castration (Orchidectomy). 14:50 min. [VHS, Beta, U-Matic].

Abstract: Routine open and close castration is described in the dog. Techniques for surgical excision of the canine testicle are described and thoughts on current techniques as related to postoperative complications are also discussed.

Descriptors: surgical methods of castration, dogs, complications.

Cat Care: A Video Guide to Successful Cat Care (1985). United Media Productions: New York, NY. 43 min. [1/2" VHS].

NAL Call Number: Videocassette No. 908

Abstract: This is one of a series of tapes on animals by Dr. Michael Fox. In this tape he shares the secrets to adopting, owning, and caring for your cat. Tips are given on eliminating fleas, vaccinations, illness, spaying/neutering, behavior, and massaging your cat. Proper care and understanding of your cat are addressed.

Descriptors: cats, cat care, veterinary care, spaying, neutering.

Feline Perineal Urethrostomy, Including Castration. School of Veterinary Medicine, University of California, Davis: Davis, CA. 23 min. [VHS].

Abstract: After a brief demonstration of castration techniques, the surgery is achieved by a single mid-line incision ending just below the anal ring. The dissection of the urethra and the creation of the stoma are detailed. Post-operative care and possible complications are indicated. Catalogue number 3281-2.

Descriptors: surgery, cat, feline, urethrostomy, gonadectomy.

Killing the Crisis, Not the Animals (1991). Association of Veterinarians for Animal Rights and the International Society for Animal Rights: Vacaville, CA. [VHS].

NAL Call Number: Videocassette No. 1450

Abstract: Speakers discuss various aspects of animal welfare such as animal sterilization, animal overpopulation, and ways to combat cruelty to animals. There are 8 videocassettes in the set.

Descriptors: conference on animal welfare, animal cruelty, pet overpopulation.

- Animal Rescue League of Martin County (1994). **Early Spay/Neuter**. Animal Rescue League of Martin County: Stuart, FL. 11 min. [VHS].
NAL Call Number: Videocassette No.2092
Abstract: Discusses the Animal Rescue League of Martin County's early spay/neuter program. Two surgical procedures, ovarian hysterectomy and castration, are demonstrated on dogs.
Descriptors: dogs, animal welfare, gonadectomy, sterilization, surgical procedures, spaying, animal rescue society.
- Boothe, H.W. and C.H. Tangner (1986). **Canine Castration**. Texas A&M University, Media Resources: College Station, TX. 11 min 20 sec. [videotape].
Abstract: Demonstrates closed castration and open castration. Catalog number VT-376.
Descriptors: castration, surgery, dog, veterinary medical school.
- Gregory, C. (1996). **Castration of the Cat**. Office of Academic Programs, School of Veterinary Medicine, University of California, Davis: Davis, CA. 10 min. [VHS].
Abstract: This video demonstrates surgical techniques during castration of a cat. Catalog number 9864-4.
Descriptors: cat, castration, surgery, techniques.
- Massachusetts Society for the Prevention of Cruelty to Animals: American Humane Education Society (1995). **Early age neutering of puppies and kittens**. MSPCA:AHES: Boston, MA. [videocassette] 30 min. [VHS].
NAL Call Number: Videocassette no. 2381
Abstract: Shows safe and efficient methods of spaying and neutering puppies and kittens.
Descriptors: spaying, castration, kittens, puppies, surgical procedure.
- Merkley, D.F. (1982). **Feline Ovariohysterectomy - Soft Tissue Surgical Techniques Series**. Iowa State University, Biomedical Communications: Ames, IA. 22 min 01 sec. [VHS].
Abstract: A technique for removal of the ovaries and uterus in the cat is demonstrated. Proper incision, ovarian pedicle mobilization and ligation are emphasized. Anatomical differences between the dog and cat are mentioned. Proper abdominal wall closure and its complications are stressed. Item number VH-0284.
Descriptors: spay, surgery, cats, veterinary medical school.
- Redhead, B. and Universities Federation for Animal Welfare. (1985). **The Control of Feral Cat Colonies**. The Universities Federation for Animal Welfare: Potters Bar, Herts, England. 13 min. [1/2" VHS].
NAL Call Number: Videocassette no.1372
Abstract: Describes effective and humane methods to control feral cats as developed by the Universities Federation for Animal Welfare at the request of the Cat Action Trust. The method is based on trapping, neutering, marking by ear-tipping and returning the cats to supervised sites where their long term care can be assured.
Descriptors: feral cats, control, humane methods.

Smeak, D. and J. Fingerth (1986). **Ovariohysterectomy and Cystotomy**. Ohio State University, College of Veterinary Medicine, Division of Educational Resources: Columbus, OH. 24 min. [videotape].

Abstract: Demonstrates the proper surgical technique for ovariohysterectomy and cystotomy.

Descriptors: cystotomy, spay, surgery, veterinary medical school.

Selected Web Sites

Alley Cat Allies.

Online: <http://www.alleycat.org/>

Description: A nonprofit organization for information on feral and stray cats. The group advocates trap-neuter-release (TNR) programs as a humane and effective method to reduce feral cat populations.

The Alliance for Contraception in Dogs and Cats.

Online: <http://www.acc-d.org/>

Description: A collaborative effort to develop and test non-surgical techniques for contraception in dogs and cats. Under Resources, there is a link to proceedings from the International Symposium on Nonsurgical Methods for Pet Population Control in 2002, 2004, and 2006.

Animal Population Control: Introduction and Index.

Online: <http://arbl.cvms.colostate.edu/hbooks/pathphys/reprod/petpop/index.html>

Description: A list of articles published by Colorado State University in a Hypertext for Biomedical Sciences called Pathophysiology of the Reproductive System. Topics include the surgical sterilization of dogs and cats, early sterilization, the effects of gonadectomy on health, behavior and performance of pets, and contraceptives for dogs and cats.

Canine Orchidectomy (Neuter).

Online: http://www.ahrdvm.com/surgery/can_neuter/can_neuter.htm

Description: A photographic demonstration of the canine orchidectomy procedure.

Canine Ovariohysterectomy (Spay).

Online: http://www.ahrdvm.com/surgery/can_spay.htm

Description: A photographic demonstration of the canine spay.

Early Age Spay-Neuter: A Tool Against Unnecessary Euthanasia.

Online: http://cfhs.ca/athome/early_age_spay_neuter/

Description: A factsheet published by the Canadian Federation of Humane Societies. The document discusses female spay and male castration and outlines some of the controversies surrounding early spay/neuter programmes (neutering between eight and 16 weeks of age).

Early Spay-Neuter: An Overview.

Online: <http://www.cvm.uiuc.edu/ope/ivb/spay-neu.htm>

Description: An online article written by T. Fuess for the Spring 1998 Illinois Veterinary Bulletin about early-age spaying and neutering.

Early Age Spaying and Neutering.

Online: <http://www.winnfelinehealth.org/reports/early-neuter.html>

Description: A summary about early spay-neuter, including information on a project funded by the Winn Feline Foundation that looks at the developmental and behavioral effects of pre-pubertal gonadectomy.

FDA Approves Neutersol for Male Puppies.

Online: <http://www.hsus.org/ace/19195>

Description: An article about neutersol, a nonsurgical alternative to neutering. Neutersol is a zinc and l-arginine-based compound that causes shrinking of the testicles and prostate.

Gonadotropin Releasing Hormone Immunocontraception in Mammals.

Online: http://www.aphis.usda.gov/wildlife_damage/nwrc/research/reproductive_control/gnrh.shtml

Description: A publication about research being conducted on immunocontraceptive methods in white-tailed deer.

Immunocontraception.

Online: <http://www.hsus.org/ace/12037>

Description: Informative articles by the HSUS about immunocontraceptive methods of fertility control in companion animals and wildlife.

Immunocontraception As a Tool for Controlling Reproduction in Coyotes.

Online: <http://texnat.tamu.edu/symposia/coyote/p35.htm>

Description: An online article written by L.A. Miller of the USDA, National Wildlife Research Center. Includes references.

National Council on Pet Population Study and Policy.

Online: <http://www.petpopulation.org/>

Description: “The National Council consists of humane organizations, breeder groups, and veterinary associations brought together to work on mutual goals regarding the pet animal surplus. The Council has conducted studies regarding animal entry and exit numbers from shelters nationally and the characteristics of animals and humans involved in relinquishment of animals to shelters. A national household survey served as a control group for the relinquishment study to help indicate which characteristics of animals and humans were really significant risk factors for failed human/animal relationships. These studies have resulted in publications in peer-reviewed journals. The significance of these publications is their effect of legitimizing the field of pet population research, and therefore encouraging other scientists to address this issue in their work.”

Neuter and Spay: It's the Humane Way.

Online: <http://www.cfainc.org/articles/neuter-spay.html>

Description: A list of questions and answers about spay and neuter procedures for cats.

Operation CatNip.

Online: <http://www.operationcatnip.org/>

Description: The official web site for Operation CatNip, “a non-profit organization dedicated to humanely reducing the stray and feral cat population through a no-cost Trap-Neuter-Return program.”

The Pet Health Library: Canine Neuter FAQ.

Online: <http://www.veterinarypartner.com/Content.plx?P=A&A=574&S=1&SourceID=42>

Description: A list of questions and answers by Wendy Brooks, DVM about neutering the male dog.

The Pet Health Library: Canine Spay FAQ.

Online: <http://www.veterinarypartner.com/Content.plx?P=A&A=584&S=1&SourceID=42>

Description: A list of questions and answers about the canine spay procedure written by Wendy Brooks, DVM.

The Pet Health Library: Feline Spay FAQ.

Online: <http://www.veterinarypartner.com/Content.plx?P=A&A=602&S=1&SourceID=42>

Description: An article written by Wendy Brooks, DVM answering various questions about spaying cats.

The Pet Health Library: Neutering the Male Cat.

Online: <http://www.veterinarypartner.com/Content.plx?P=A&A=563&S=1&SourceID=42>

Description: A factsheet written by Wendy Brooks, DVM about the neutering procedure in male cats. Also includes a discussion of early neutering.

Spay and Neuter Information Page.

Online: <http://www.doghouse.com/neuter.html>

Description: Provides links to articles about spaying and neutering companion animals.

Spay/USA.

Online: <http://www.spayusa.org/>

Description: A program to provide a nationwide network and referral service for affordable spay/neuter services.

Spaying and Neutering Cats.

Online: <http://www.peteducation.com/category.cfm?c=1+1364>

Description: This web site is Dr. Foster and Smith's source for expert pet information. “Know the benefits and risks of spaying and neutering cats and kittens including when the surgery can be performed. Pet overpopulation is on the rise so find out more to help you prevent this problem in your community.”

The Surgery Suite.

Online: http://www.marvistavet.com/html/surgery_suite.html

Description: There are 4 links in the surgery suite section that address spaying and neuter-

ing your pet. The sections are 1) Canine Neuter; 2) Neutering the Male Cat; 3) The Canine Spay; and 4) The Feline Spay. Each section contains basic information about the procedure and the associated benefits.

US Worldwide Low Cost or Free Spay / Neuter Resources FAQ.

Online: <http://neuterspay.org/>

Description: A list of frequently asked questions (FAQs) about spaying and neutering as well as a link to a searchable database for locating free or low-cost spay/neuter clinics worldwide.

Welcome to the Surgery Room.

Online: <http://www.thepetcenter.com/sur/surgery.html>

Description: Contains information about various veterinary surgeries, including spaying or neutering cats and dogs. The surgery sections include descriptions of the procedures as well as pictures. There are links to information sheets about the cost of spay/neuter and pyometra.

Why You Should Spay or Neuter Your Pet.

Online: <http://www.hsus.org/ace/11879>

Description: Information about spaying and neutering companion animals from the Humane Society of the United States. Includes links to other articles about pet population control produced by the HSUS.

Animal Welfare Position Statements on Companion Animals. *American Veterinary Medical Association.*

Online: <http://www.avma.org/issues/policy/default.asp>

Description: The AVMA's official position statements on issues such as dog and cat population control, early-age spay/neuter, and feral cat populations.

Neutering Male Dogs. *David Appleby.*

Online: <http://www.apbc.org.uk/article4.htm>

Description: This is an article written by David Appleby for the Association of Pet Behaviour Counsellors, a UK-based network of experienced behavior counselors who, on referral from a veterinary surgeon, are able to offer the time and expertise necessary to treat pets with behavior problems.

Neuter/Spay Assistance and Information ~ Oregon, Washington, Nationwide.

Online: <http://neuterspayoregon.blogspot.com>

Description: Oregon's first statewide spay/neuter referral resource - helping animals, the public, and animal groups since 2001. Provides information about state by state programs and includes a page on early spay-neuter.

Canine Spay. *Long Beach Animal Hospital.*

Online: <http://lbah.com/canine/spay.html>

Description: Includes a description and photos of the ovariohysterectomy (spay) of a dog. The page also discusses reasons why spays are performed.

A New Alternative - Animal Techniques Training on Models. *Sally Walshaw.*

Online: http://www.lawte.org/materials/walshaw/walshaw_notes.pdf

Description: Written by Sally Walshaw, DVM. Information and examples of various models used in teaching animal surgery and techniques such as injection and blood collection.

Early Spay/Neuter in the Cat. *Susan Little.*

Online: <http://www.catvet.homestead.com/EarlyAlter.html>

Description: Written by Susan Little, DVM. Contains information about prepubertal gonadectomy in cats, including guidelines, references, and photos.

