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16 November 2009

Mr. Gary Reese
Las Vegas City Council
400 Stewart Avenue
Las Vegas, Nevada 89101

Dear Mr. Reese,

On November 18, 2009, the Las Vegas City Council will be hearing Bill #2009-44 as item #66 on the agenda. I would like to express an opinion regarding the proposal for neutering (generic term for removing the gonads of a male or female) dogs and cats not being used for breeding or show purposes. While much has been made regarding the potential health ramifications of these elective procedures, most of the information has been derived from the article "Early Spay-Neuter Considerations for the Canine Athlete", written by a Dr. Zink. Close examination of the article reveals many errors and misinterpretations that can be characterized as either mistakes due to lack of understanding the current literature or outright attempts at deception. Facts obtained from the many legitimate studies that have been done indicate that, in short, there are very few contraindications that are not outweighed by the benefits to neutering dogs and cats at what has been termed an "early" date.

The current bill states that animals over 4 months of age that do not meet specific criteria should be neutered. This age may be considered early by some but it not the same as many of the "early-age" studies that have been performed where 8 to 12 weeks is considered. Therefore the argument about 4 months being too young in this case is not valid. There are a number of advantages of neutering prior to sexual puberty that are enumerated in the research that has been done. Anesthesia and surgery can be done very safely on animals at 4 months just as with older animals as long as the proper precautions are taken.

All health aspects aside, one of the primary aims of this proposal is an attempt to decrease the over abundance of dogs and cats that currently afflict the city of Las Vegas. This is a known problem as evidenced by the number of strays, feral animals, and unwanted shelter 'turn-ins' that are either housed temporarily at the local shelter or are euthanatized each day. The number is such that the shelter is not able to adopt all of the animals to new homes and so the shelter is forced to either house them indefinitely or humanely euthanize them. We know that indefinite housing is not a viable option as it has been attempted before at the local facility and led to the shelter in Las Vegas being labeled as the worst in the country at one time. Euthanizing animals is not a pleasant option for any concerned. It is very stressful on the individual(s) that is (are) required to take the lives of the animals. It is a considerable waste of resources while coming to the determination that euthanasia is necessary. As far as a public relations matter it is obvious that public opinion would be largely unfavorable. All of the consequences of euthanasia lead to the selection of other less than adequate options as described above. As you can see there is no benefit to pet overpopulation and many detrimental consequences.

Problems in addition to those listed above include public health issues such as animal attacks, zoonotic diseases (spread from animals to man), and sanitation concerns. Some of the diseases include rabies, bubonic plague (yes, it is found in Clark County), parasitic infection, and some not so serious such as ringworm. Animals that are struck by automobiles are a concern as well in that attempting to avoid collision may lead to serious automobile accidents. Additionally, tax dollars spent on trying to alleviate the overpopulation is a drain on society and in this day and age wasted money is unconscionable.

Many individuals will argue that it is not for the government to determine what individuals do in the privacy of their own homes. While I agree with this, I also realize that what one does that affects the safety and freedoms of others is very often (if not always) regulated for the good of all. I believe that this bill addresses one of these issues. The bill does not curtail ones ability to engage in the planned reproduction of special or unique animals. In fact it will legitimize the practice and encourage responsibility. It does not require that animals used for various competitions be neutered but allows the responsible owner to pursue their avocation unrestricted.

As with any activity that has the potential to cause problems or harm, it is the responsibility of elected officials to enact legislation for the common good. Will this bill eliminate the problem of animal overpopulation? The answer is very simple. By itself it will not! However, as a <u>part</u> of a larger plan it can ultimately lead to improvement of a currently unacceptable situation.

Thank you for taking the time to consider this opinion. Should you have any questions please feel free to contact me.

Respectfully,

Dennis Olsen, DVM MS
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DAVID C. HENDERSON, D.V.M.

VETERINARY CONVENTION

November 16, 2009

Mayor Pro Tem Gary Reese
Las Vegas City Council Member
400 Stewart Ave
Las Vegas NV 89101

Dear Mayor Pro Tem Reese:

Re: My support for the Spay/Neuter Ordinance 2009-44.

I've been a practicing veterinarian in your district for more than 26 years. I initially became aware of the pet overpopulation problem in the late 1980s when I provided the veterinary services for the city of Las Vegas animal shelter. I've watched the animal overpopulation problem continue to fester because local leaders were unwilling to deal with the issues that contributed to the problem. I concluded 20 years ago that the small percentage of pet owners who contribute most of the problem could not be educated into compliance. I know. I tried. I see these people every day in my private practice and they are unwilling to accept that they are part of the problem.

This has been recently confirmed by myself and other organizations who offer free spay and neuters, free microchips and free vaccinations during pet fairs conducted with the local animal control agencies. Over half of the people that attend these pet fairs refuse to get their animals spayed or neutered even at no cost. They are there to get the free vaccinations, only because they are mandated by law. Those that do schedule the spay and neuter frequently fail to show up for their free appointment. When you do the math, that means five out of six of these targeted pet owners refuse to spay and neuter their animals, leaving them free to reproduce and contribute to the overpopulation problem. None of these people believe that they are part of the problem. I am presently working with both Heaven Can Wait and the Las Vegas Valley Humane society, two organizations that are providing low cost and no cost sterilizations. This year we will sterilize 13,000 animals.

Combine this number with the number of private practices that are now providing low cost spay and neuters. One can conclude any responsible pet owner can get their pet sterilized either at low cost or for free. One has to wonder why we continue to have a pet overpopulation problem. It's my belief that the irresponsible pet owner can only be brought into compliance through laws. I am in full support of the proposed ordinance. Without its passage, we will not solve our pet overpopulation problem.

Cordially,

David C. Henderson

Submitted at City Council
Date 11/18/09 Item 66

Heaven can wait animal society

Heaven Can Wait Animal Society
P.O Box 30158
Las Vegas, NV 89173-0158
(702) 227-5555
www.hcws.org

Tax Exempt 501 (c)(3)

November 17, 2009

Dear Councilmen and Councilwoman,

We respectfully submit the following pages to be considered when voting on the Mandatory Spay/Neuter Ordinance which will come before you tomorrow, November 18, 2009. They contain a 5-Year Plan on how to solve the pet-overpopulation problem we face here in Las Vegas. This final version was carefully constructed over the past few years by people who see and come into close contact with the detrimental effects that unregulated reproduction has not only on the welfare of the animals, but also the people in our local neighborhoods. In order for this plan to reach its full potential, however, we must possess the tools to properly implement it.

All of us are aware that there will most certainly be a fear of change when dealing with an issue that has been unchanged for so long. And sometimes that fear will come out in an angry, vocal way at the council meetings. But our group and those involved in the creation of this plan aren't the kind of people interested in yelling over everyone else in order to get our squeaky wheel greased. What we are most concerned with is making a difference in the community that reaches beyond making a dollar or taking away someone's rights. It goes toward setting a standard of responsibility which must be met by those people who take on the privilege of accepting an animal into their lives. There are certain things which an animal requires to live a long, healthy life and spaying/neutering is on the top of that list.

Thankfully, we have a model to refer to when looking at how a 'yes' vote on this ordinance would come across in the community. North Las Vegas passed a similar ordinance last year and after an initial fear that people would lose their animals because they couldn't afford to sterilize them and that breeders would also lose the ability to practice their trade, it has been nothing short of a wonderful success. The fears were quickly subdued when people realized that this change in policy wouldn't affect their lives in a negative way or cause them to lose a source of income. Heaven Can Wait was able to go out into the community and offer free sterilizations on an ongoing basis to those in need, and we are still helping people in those areas today. In fact, it has now been fully embraced by the residents and the leap of faith over this issue by the North Las Vegas councilmen and councilwomen is what is to thank for such a positive change.

We greatly appreciate you taking the time to review our plan and to consider the potential it has to make a dramatic change in the staggering impound and euthanasia rates in Las Vegas. A vote of 'yes' for the Mandatory Spay/Neuter Ordinance would provide the foundation to overcome our local pet-overpopulation tragedy.

Sincerely,

Harold Vosko

Harold Vosko
Executive Director
Heaven Can Wait Animal Society
702-845-0818
www.hcws.org

Submitted at City Council
Date 11/18/09 Item 66

Heaven can wait
animal society

P.O Box 30158
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Non-Profit Organization
Tax Exempt 501 (c)(3)

Proposed 5-Year Strategic Plan

There is a significant pet overpopulation problem in the Las Vegas area which results in the euthanasia of 30,000 animals in our local shelters each year. The following is a proposed five-year strategic plan by Heaven Can Wait Animal Society (HCWS) in partnership with the Las Vegas Valley Humane Society, Nevada Society for the Prevention of Cruelty to Animals, Animal Control, Lied Animal Foundation, and the Clark County Feral Cat Colony Central Sponsor to address this issue. It should, if supported by the community, help achieve our goal of reducing pet overpopulation and the resulting euthanasia rate.

1. Aggressive Spay/Neuter:

Identifying and sterilizing the right group of animals is the highest priority since these sterilizations will have the most long-term impact on euthanasia rates. The first group are animals, such as feral cats that have a high likelihood of reproducing. The second group are pets that belong to people who would not normally sterilize their animal. This population of pet owners may need additional services such as transportation of pets to and from the clinic. The third group of animals are dogs that have aggressive tendencies and low odds of adoption. This group includes breeds such as Pit Bulls, Chows, German Shepherds, Akitas, Rottweilers, and Shar Peis.

Projected Spay/Neuter Goals

2010-2011	20,000	(HCWS & Las Vegas Valley Humane Society-15,000) (Lied-5,000)
2011-2012	20,000	same as previous year
2012-2013	22,000	(HCWS & Las Vegas Valley Humane Society-16,000) (Lied-6,000)
2013-2014	22,000	same as previous year
2014-2015	23,000	(HCWS & Las Vegas Valley Humane Society-16,000) (Lied-7,000)

Total: **107,000 Sterilizations**

* Lied is a key component of collecting data regarding which breed or breed mixes are being euthanized, which should be targeted for sterilization.
* Animal Control is a key component of advising the rescue groups of the pet overpopulation areas that need our focus and attention.
* The good news is that many veterinary hospitals are lowering their s/n prices. Therefore, more people can afford to sterilize their pets, which will allow us to focus on targeting.

2. Education:

The education goals should target both young people and adults.

A. Education of children today can result in responsible pet owners tomorrow. We propose a three part approach to addressing the educational needs of young people.

First, visit elementary schools and establish an outreach organization in which older students can participate. Visiting elementary schools every year would be optimal, but problems of manpower, time and school district bureaucracy create serious obstacles. Currently, Nevada SPCA and HCWS visit schools on an invitation only basis. Our projected goals for the next five (5) years are as follows:

2010 - 2011	10 schools
2011 - 2012	20 schools
2012 – 2013	30 schools
2013 – 2014	40 schools
2014 – 2015	50 schools

Second, supply teachers with pet friendly materials that teach children math and the like with emphasis on pet ownership responsibilities. HCWS is currently doing this in one school. Our projected goals for the next five (5) years are as follows:

2010 – 2011:	Setup a website from which teachers can download and use materials for their students to learn about responsibilities of pet ownership, 10 classes
2011 – 2012	50 classes
2012 – 2013	100 classes
2013 – 2014	150 classes
2014 – 2015	200 classes

The third goal is to establish youth groups that emphasize vaccination, sterilization and microchip identification of all pets. Hopefully responsible pet ownership will come to mean more than feeding and sheltering an animal. These organizations may be able to raise money for spay and neuter clinics and pet adoptions. Once established, these groups can help spread the word that 30,000 animals are killed annually in this valley and set a precedent for more responsible pet ownership in the future.

The ideas and materials for implementation of this program will be available to download from a website.

Member Recruitment Goals

2010-2011	500 members
2011-2012	1,000 members
2012-2013	1,500 members
2013-2014	2,000 members
2014-2015	2,500 members

B. Education of adults who currently own an animal is the second part of our education goals.

Sometimes people decide not to sterilize their pet for cultural reasons. Certain members of the large Hispanic population in Las Vegas, for example, will often not place a high priority on spay and neuter. We believe reaching out to these individuals through their churches, cultural centers and media outlets will assist in addressing the overpopulation problem. During the 2010-2011 timeframe, a committee or coalition will be established to develop materials towards this objective.

3. Legislation:

Strong legislation is needed in order to have a meaningful and permanent solution to the pet overpopulation problem. Laws that regulate reproduction can catalyze a shift in the responsible pet ownership paradigm. People will realize that it is wrong to allow indiscriminate reproduction as this has serious consequences such as massive euthanasia rates. Laws will reinforce the concept that those who are not part of the solution (by spaying and neutering their pets) are probably part of the problem (pet overpopulation and high euthanasia rates). Laws can clearly define only two acceptable types of pet owners. These are responsible pet owners with sterilized pets and responsible breeders who breed only healthy breeds that are in demand and are regulated by animal control.

Projected Ordinance Goals

2010-2011	North Las Vegas already has a mandatory spay/neuter ordinance
2011-2012	Another city entity comes on board by enacting a mandatory spay/neuter ordinance
2012-2013	Two more cities join the fight
2013-2015	It is our goal that by this point all (6) city entities have enacted some variation of the mandatory spay/neuter ordinance

4. Adoptions and Better Use of Resources:

Encouraging potential pet owners to adopt only from shelters and humane groups will ultimately decrease euthanasia rates. At the present, according to the Humane Society of United States, only 14% of new pets come from a humane group or animal shelter, and 86% of new pets are obtained from pet stores, back-yard breeders, strays and some from professional breeders. People that adopt from a shelter are the only group that are assured that their pet is already sterilized, micro-chipped, and vaccinated, putting them on the path to responsible pet ownership right from the start..

Furthermore, over 5 million animals are euthanized every year in the United States. 90% of monies from rescue groups are spent on reactive measure or on rescues. Only 10% is spent on proactive measures such as strong spay/neuter programs, which prevent litters from being born; therefore, reducing the need to rescue and euthanize.

5. Feral Cats:

Talk about targeting the population that is most likely to reproduce! It is no secret that feral cats, also known as neighborhood cats, can reproduce at an uncontrollable rate. Therefore, targeting this demographic has to be our top priority.

1. There are too many feral cats.
2. Over 20,000 cats are euthanized annually in local shelters.
3. Many more die inhumanely in the streets or in the desert.
4. Feral cats can have a big impact on the environment.

2010 – 2011: A Feral Cat Coalition recently formed. This coalition already has 10 members
2011 – 2012: Increase the Coalition membership to 50
2012 – 2013: Increase the Coalition membership to 100
2013 – 2014: Increase the Coalition membership to 150
2014 – 2015: Increase the Coalition membership to 200

This Coalition will do the following:

1. Organize trappers to use our resources better.
2. Trap by real estate instead of the shotgun approach we have already been doing for years
3. Register the colonies that are currently legal in the County and City.

Projected Goal For Registered Feral Cat Colonies (Central Sponsors)

2010 – 2011 200 Registered colonies
2012 – 2013 300 Registered colonies
2013 – 2014 400 Registered colonies
2014 – 2015 500 Registered colonies

Feral cats have the highest risk of reproducing. Therefore, this demographic must be the focus of our sterilization efforts.

6. Annual Conference and Formation of Coalitions:

It is very important to have at least one annual conference.

1. The conference will bring all the groups together, and unite our efforts to reduce the pet overpopulation problem in our community.

2. The outcome of the conference should be shared with the public, so they can find out about the successful outcome of our efforts.

3. The conference will educate the public about the pet overpopulation problem, and provide them with solutions.

In addition, to give each program the best chance to succeed, we propose that each category be spearheaded by a coalition. For instance:

1. Spay and Neuter Coalition [HCWS, Las Vegas Valley Humane Society, and Lied]

2. Legislation [Nevada Voters, Las Vegas Valley Humane Society, and AC]

3. Education [Nevada SPCA and HCWS]

4. Adoptions [Nevada SPCA]

5. Feral Cats [Clark County Central Sponsor, Las Vegas Valley Humane Society, and HCWS]

6. Conference [Nevada Voters, Nevada SPCA, Las Vegas Valley Humane Society, AC, HCWS, and Lied]

We welcome, encourage, and look forward to your thoughts and comments as we proceed to finalize the Proposed 5-Year Strategic Plan.

Gia Rodriguez

From: vegasdvm@yahoo.com
Sent: Tuesday, November 17, 2009 11:45 AM
To: Councilman Gary Reese
Subject: Internet Submission - Support for bill 2009-44

Citizen Name: Andrea Larson

Email: vegasdvm@yahoo.com

IP Address: 67.239.210.171

Comments: Dear City Council member,

My name is Andrea Larson. I am a veterinarian in the Clark County area. I am writing in support of Bill No. 2009-44 which is on the agenda for the city council meeting taking place tomorrow, November 18, 2009.

As you may know, Bill No. 2009-44 will require that dogs and cats over the age of four months be spayed or neutered, except under specified circumstances.

I am in full support of passing this bill making it required to spay or neuter your dog or cat once it is four months of age or greater. Such a bill will help to decrease the number of unwanted dogs and cats that are euthanized in our local shelters every year.

In response to statements I have heard people make that spaying or neutering your dog or cat is inhumane, cruel or disfiguring to the animal, I will tell you this is simply not true. Animals are fully anesthetized for any such surgical procedure as well as given pain medication before and after the procedure. The procedure is not disfiguring in any way--aside from a small scar from the incision, there is no visible evidence that anything has been done to the dog or cat after a spay or neuter.

I hope you will consider the benefits of passing this bill when making your decision. This bill would help to decrease the financial resources spent every year in housing, feeding and, unfortunately, destroying thousands of animals each year by decreasing the number of animals that end up in our local shelters.

If you have any questions, please feel free to contact me at (702) 204-9663 or via email at vegasdvm@yahoo.com.

Thank you for your time and consideration of this matter.

Sincerely,
Andrea L. Larson, DVM

Date: 11/17/2009 11:45:04 AM

Submitted at City Council
Date 11/18/09 Item 66

Rebuttal to "Early Spay-Neuter Considerations for the Canine Athlete"

Lisa M. Howe, DVM, PhD, Dipl. ACVS
Associate Professor, Small Animal Surgery Co-Chief
Surgical Sciences Section Dept. of Veterinary Small Animal Clinical Sciences
College of Veterinary Medicine and Biomedical Sciences
Texas A&M University College Station, TX, 77843

I have written a rebuttal to Dr. Zink's article entitled "Early Spay-Neuter Considerations for the Canine Athlete" in which Dr. Zink attempts to make an argument for revisiting the "standard protocol in which all dogs that are not intended for breeding are spayed and neutered at or before 6 months of age." In his discussion, Dr. Zink quotes manuscripts incorrectly in some instances, doesn't present *all* of the data from given studies (ie, misrepresenting the findings of the studies) in other instances, and doesn't include the interpretation of the data by the study's authors (leading to erroneous interpretations of some data by Dr. Zink) in yet other instances. While I typically don't write rebuttals to others' writings, or opinions (after all, we are all entitled to our opinions), the multiple errors and misrepresentations of the scientific literature quoted in this dissertation compelled me to "set the record straight" with regard to the literature being incorrectly cited by Dr. Zink. While I respectfully disagree with Dr. Zink's opinion on the appropriate age at which to spay and castrate dogs not intended for breeding, my primary purpose for this rebuttal is to present the literature that Dr. Zink cites in a more accurate, and more complete, fashion so that the veterinarian reader may reach their own conclusions regarding the most appropriate time to spay or castrate the nonbreeding animal, *based upon accurate representation of the scientific literature.*

Orthopedic Considerations

Dr. Zink points out correctly that in Salmeri's 15-month study (examining the effects of prepubertal gonadectomy on skeletal growth, weight gain, food intake, body fat, and secondary sex characteristics in 32 mixed-breed dogs neutered at seven weeks or seven months or left intact) that bitches spayed at 7 weeks grew significantly taller than those spayed at 7 months, and that those spayed at 7 months has significantly delayed closure of the growth plates (but didn't grow significantly taller) than those not spayed (Salmeri, 1991). However, the concerns expressed by Dr. Zinc regarding changes in stifle joint angles are not supported by any existing literature, and don't make sense as an argument against "early age "gonadectomy (ie, gonadectomy performed well before 6 months of age). Since the animal that is gonadectomized early will not have likely had closure of any of the hind limb long bone physes, it stands to reason that closure of all of the physes will be delayed resulting in longer, but proportional, bone growth as related to the stifle joint. In fact, Salmeri's study did not identify any changes in the proportional nature of bone growth of the forelimb (she was studying growth and maturation of the radius and ulna). It seems that Dr. Zink may be arguing against performing gonadectomy during the time period between 7 or 8 months of age and final closure of all the growth plates, which isn't relevant to a discussion of "early age" gonadectomy. Dr. Zink's speculation regarding joint angles cannot be applied to, and isn't discussed in, the article cited

regarding increased incidence of cranial cruciate ligament rupture in gonadectomized dogs. There is no information in the article (Cooley, 2002) as to the timing of gonadectomy in the study population, so there is no way of knowing if animals were spayed/castrated after adulthood, at the "traditional age", or at an "early age", and it is, therefore, not appropriate for Dr. Zinc to be applying his theory to that article. In fact, in the article, bone lengths and joint angles are never mentioned, and the authors speculate their findings may be attributable to: "alterations in sex hormones may affect the size, shape, or material properties of the ACL."

Regarding hip dysplasia, long-term studies have examined the incidence of hip dysplasia in dogs and the association with age at gonadectomy, and Dr. Zink quotes one of them. The study of 1842 dogs found that early age gonadectomy was associated with a significant increased incidence of hip dysplasia (Spain, 2004). Puppies that underwent gonadectomy before 5.5 months of age had a 6.7% incidence of hip dysplasia, while those that underwent gonadectomy at the more traditional age had an incidence of 4.7%. However, Dr. Zink fails to note the additional finding of that study which included finding that those dogs that were gonadectomized at the traditional age were *three times more likely to be euthanized* for the condition as compared to the early age group, leading the authors to suggest that early age gonadectomy may be associated with a less severe form of hip dysplasia.

Cancer Considerations

Dr. Zink states: "There is a slightly increased risk of mammary cancer if a female dog has one heat cycle." Others would tend to believe, based on the scientific literature, that there is more than a "slightly increased" risk. In fact, the literature states that the risk of developing mammary tumors in dogs spayed prior to the first estrus is 0.5%, *8% after the first estrus, and after the second estrus the risk will increase to 26%* (Schneider, 1969). The sparing effect of OHE is lost after females have cycled more than twice or are older than 2.5-4 years of age. Hence, this is one of the reasons veterinarians recommend spaying *before* the first heat cycle. Mammary neoplasms are the most common tumors of the female dog (MacEwen, 1996). Additionally, the rate of malignancy of mammary tumors in dogs is typically considered to be closer to 50% (rather than the 30% stated by Dr. Zink) and clearly a significant problem in the intact female dog (Brodey, 1983; Gilbertson, 1983). Dr. Zink then goes on to state his own personal belief that canine athletes have more problems with cranial cruciate ligament injury than with mammary neoplasia. Clearly, there is no information in the literature to support such a statement, or comparison. This is comparing apples and oranges, and not appropriate. As with human athletes, it is probably appropriate to believe that the canine athlete will suffer athletic injuries (ie, torn cruciate ligaments, etc.), but to compare disease entities, and make statements about the prevalence of these entities (based upon personal biases) is not valid.

Related to the incidence of cardiac tumors, the study by Ware, et al., has been misquoted when Dr. Zink stated that: "A retrospective study of cardiac tumors in dogs showed that there was a 5 times greater risk of hemangiosarcoma, one of the three most common

cancers in dogs, in spayed bitches than intact bitches and a 2.4 times greater risk of hemangiosarcoma *in neutered dogs as compared to intact males*." The study, in fact, stated that "the relative risk of a tumor in *intact males* was 2.44 times the risk in *intact females"* (Ware, 1999). That study did show that the relative risk for hemangiosarcoma in spayed females was >5 times that for intact females, but "that castrated males had only a slightly greater risk (1.6 times) of developing a heart tumor than did intact males." The exact cause for the increased risk in spayed females, as compared to intact females was not identified. It is important to recognize that cardiac tumors are not common compared to other tumor types (including mammary neoplasia in the intact bitch) and the overall incidence of cardiac tumors in that study was 0.19%.

Osteosarcoma has been demonstrated in some studies to occur more frequently in gonadectomized dogs, however, one of the studies cited by Dr. Zink has been mischaracterized. Dr. Zink describes Cooley's study as "a study of 3218 dogs" in which dogs neutered before a year of age were found to have a significantly increased chance of developing bone cancer." In reality, however, Cooley's study is a study *of 683Rottweiler breed dogs* (Cooley, 2002). Rottweilers were selected for the study, as stated by the authors of the study, because their risk of bone sarcoma is very high compared with other breeds. The study found that bone sarcoma was diagnosed in 12.6% of the dogs, and that male and female dogs that underwent gonadectomy before 1 year of age (can't be defined as "early age" gonadectomy) were significantly more likely to develop bone sarcoma than dogs that were sexually intact. The second study quoted by Zink did indeed find a twofold higher risk of osteosarcoma among neutered dogs as compared to intact dogs (Ru, 1998). This study involved 3062 purebred dogs with osteosarcoma as compared to 3959 purebred dogs without osteosarcoma. However, in that study, no information was reported regarding when surgical neutering took place, so it is inappropriate to apply this article to arguments pertaining to "early age" gonadectomy.

Regarding the relation of castration and neoplasia, it is well documented that prostatic neoplasia occurs in both intact and neutered male dogs, and that castration does not protect against the development of prostatic carcinoma (Obradovich, 1987; Krawieic, 1992; Bell, 1991; Barsanti, 2003). However, it is also well documented in the scientific literature that castration (including early castration) does help prevent other prostatic diseases seen in intact male dogs including benign prostatic hyperplasia, cystic hyperplasia, squamous metaplasia, paraprostatic cysts, prostatitis, and prostatic abscessation (Berry, 1986; Black, 1998; Cohen, 1995; White, 1987; Barsanti, 2003; Cowan, 1991; White, 1995; Hardie, 1984; Mullen, 1990).

Behavioral Considerations

Dr. Zink begins the discussion of behavioral considerations by incorrectly stating that "The study that identified a higher incidence of cranial cruciate ligament rupture in spayed or neutered dogs also identified an increased incidence of sexual behaviors in males and females that were neutered early (Slauterbeck, 2004). In fact, Slauterbeck's paper *never* mentions *anything* about sexual behaviors. The next paper cited is Spain's

paper which did demonstrate an increased incidence of noise phobias and undesirable sexual behaviors in the dogs undergoing early age gonadectomy (Spain, 2004). Dr. Zink fails to point out other behaviors that were *decreased* in dogs gonadectomized before 5.5 months, including escaping behavior, separation anxiety, and urinating in the house when frightened. The study also found that three behaviors were significantly associated with age at gonadectomy for males but not females, and included aggression towards family members, barking or growling at visitors, and excessive barking that bothered a household member. These three behaviors were significantly associated with one another, and were seen more frequently in males gonadectomized before 5.5 months of age. When looking at all the behaviors taken together, authors found that overall, the relinquishment rate was lowest among dogs gonadectomized before 5.5 months (7.5%), whereas those gonadectomized $\geq$ 5.5 months of age had a higher relinquishment rate (10.4%). Howe's study of 269 dogs also showed that "early age" gonadectomy was not associated with higher return rate or increased rate of placement in another home after adoption, compared with traditional age gonadectomy (Howe, 2001). In that study, there was no difference in the incidence of overall or specific behavioral problems between age groups. Regarding the recent report of the American Kennel Club Canine Health Foundation, Dr. Zink stated that the study "reported *significantly more behavioral problems* in spayed and neutered bitches and dogs". However, upon reading the reference cited by Dr. Zink, there is no such finding reported in the paper (http://www.akcchf.org/pdfs/whitepapers/Biennial_National_Parent_Club_Canine_Health_Conference.pdf, 2005). The report does, however, note *2 behaviors seen more frequently* in neutered animals and the paper states that "male dogs had more aggression behavior problems and that females were more fearful. These differences were even more extreme when looking at only neutered animals, even after excluding animals neutered for behavior problems." The reference states that dogs were 1 year of age when studied, but doesn't report when dogs underwent gonadectomy (ie, at an "early age" or at the "traditional age").

Dr. Zink goes on to state that another study "showed that unneutered males were significantly less likely than neutered males to suffer cognitive impairment when they were older" (Hart, 2001). However, that study did *not* show that intact males were less likely than neutered males to suffer cognitive disorders when they were older. In fact, results of the paper demonstrated that "there were no significant differences among groups (gender status) in regard to percentages of dogs that progressed from not having any impairments to having impairments in 1 category or to having impairments in $\geq$ 2 categories". Hence, the study showed that neutered male dogs were *not* any more likely to suffer cognitive disorders than intact dogs. However, what the study did show in dogs that were *already affected,* was that the "percentage of dogs that progressed from being mildly impaired (ie, impairments in 1 behavioral category) at the time of the first interview to being severely impaired (ie, impairments in $\geq$ 2 categories) at the time of the second interview was significantly higher for neutered than sexually intact male dogs." However, it is important to note that the animals in this study were spayed at a mean age of 2.8 years (SD, 0.1) and the mean age for castration of the male dogs was 4.8 years (SD, 1.2), making the paper irrelevant to a discussion of "early age" gonadectomy.

Other Health Considerations

Dr. Zink mentions other health considerations that should be considered when deciding whether the canine athlete should undergo gonadectomy at, or before, 6 months of age. Dr. Zink states: "A number of studies have shown that there is an increase in the incidence of female urinary incontinence in dogs spayed early", and gives one reference for this (Stocklin-Gautschi, 2001). Indeed, there have been several studies that have demonstrated an increased incidence of urinary incontinence in dogs spayed early, as well as a study that demonstrated a much higher incidence of urinary incontinence (20.1%) in bitches spayed *after* the first estrus, as compared to those spayed before the first estrus (Arnold, 1992). In fact, in the reference (Stocklin-Gautschi, 2001) that Dr. Zink quotes, the authors go on to interpret the findings of their study in relation to similarly performed studies, and then state in the discussion: "A comparison of the present results with those of Arnold, et al. (1992) indicates that the risk of urinary incontinence is *lower* in early spayed bitches than in bitches spayed after the first oestrus, but that the clinical signs of the affected animals are significantly more pronounced." The authors continue and state: "However, assuming that most incontinent bitches respond well to medication, this factor is of minor importance. *This relative disadvantage of early spaying is negligible when compared with the benefits, such as lower incidence of urinary incontinence and the protection against mammary tumours.*" On the other hand, the recent study of 1842 dogs by Spain, et al., demonstrated that there *was* an increased incidence of urinary incontince in female dogs, with the risk being greatest in females gonadectomized before 3 months of age, compared with those gonadectomized at, or after, 3 months of age (Spain, 2004). Based upon their findings, Spain concludes: "Because urinary incontinence was greater among puppies gonadectomized before 3 months of age and incontinence can be a lifelong condition requiring ongoing treatment, it is reasonable to conclude that female dogs should not be gonadectomized until at least 3 to 4 months of age." The authors continue: "This may be particularly prudent for a shelter that does not have an excess of puppies and is focused on reducing medical and behavioral conditions that could lead to relinquishment of adolescent and adult dogs. Conversely, for shelters with excess puppies, the advantages of gonadectomy of all dogs before adoption may outweigh the risk of urinary incontinence."

Dr. Zink also points out that neutering of male dogs has been associated with an increased likelihood of urethral sphincter incontinence (Aaron, 1996) and seems to imply that early neutering plays a role in this. However, when one examines Aaron's paper, it becomes obvious that the dogs that developed urethral sphincter incompetency following castration were *adult* dogs when castrated, with the median age of onset of urinary incontinence being 6 years (range 6 months to 10.5 years), and the median period between castration and the onset of incontinence being 10 days (range "immediately" to 18 months). Clearly, this paper should not be quoted as an argument against early neutering (or late neutering, for that matter) in male dogs. Urethral sphincter incompetency is quite uncommon in male dogs, and is likely multifactorial in nature, considering male dogs don't tend to respond well to hormonal replacement (Aaron,

1996). When one considers the incidence of prostatic hyperplasia, cysts, and abscesses in older male dogs (much higher than urethral sphincter incompentency), and the potential life threatening nature of some of these problems, the role for castration in preventative health care for male dogs becomes obvious.

Hypothyroidism is cited as another health reason to avoid early gonadectomy. Dr. Zink is correct that both the cited references (http://www.grca.org/healthsurvey.pdf and Panciera, 1994) do demonstrate that hypothyroidism occurs more commonly in gonadectomized dogs (including the Golden Retriever breed) than in intact dogs. While there is an association, the overall incidence of hypothyroidism is 0.2% in canines (Panciera, 1994 - although it may be higher in certain breeds such as the Golden Retriever and Doberman Pinscher). It would not be prudent to discourage spaying/castrating of dogs (early or not) to prevent a disease with such a low incidence that has a good response to treatment in most dogs (Panciera, 1994), when other diseases have much higher incidences (mammary neoplasia, pyometra, prostatic hyperplasia, etc.) and may not have as favorable an outcome.

Infectious diseases are cited as another reason to avoid early gonadectomy. While Dr. Zink does correctly state the findings of the cited reference which were that infectious diseases were more common in dogs spayed/castrated at 24 weeks of age or less as compared to those undergoing gonadectomy at more than 24 weeks (Howe, 2001), Dr. Zink fails to point out the conclusions of the author related to this issue. Howe notes in that article that: "Parvoviral enteritis was the most commonly reported infectious disease and was reported exclusively in dogs that underwent prepubertal gonadectomy. Parvovirus enteritis is common from puppies from shelter environments, but uncommon in older dogs. *The potential influence of anesthesia and surgery on the incidence of parvoviral enteritis in puppies that underwent gonadectomy could not be determined in our study, because comparisons with puppies that did not undergo gonadectomy were not performed.*" Spain's study of 1842 dogs also found that dogs gonadectomized before 5.5 months had a significantly greater incidence of parvoviral enteritis (as compared to those gonadectomized later), but went on to say: "In that study (Howe, 2001), as with ours, however, the increased rate of parvovirus infection probably represented increased susceptibility of dogs < 6 months of age during the periadoption period and not long-term immune suppression or long-term susceptibility as a result of early-age gonadectomy" (Spain, 2004).

Interestingly, Dr. Zink did not address one of the major health concerns of the unspayed bitch which is pyometra, a potentially life threatening condition. Pyometra occurs at a very high rate in unspayed bitches, and the incidence has been reported to approach 66% in bitches over 9 years of age (Johnston, 2001). Unlike the United States, in Scandinavian countries, female dogs are at risk of developing pyometra since elective neutering of healthy bitches is seldom performed, resulting in only 7% of bitches being spayed (Egenvall, 1999). A recent study in Sweden was conducted to assess the incidence of pyometra in bitches using data obtained from a Swedish pet insurance company, and it was found that overall, almost 25% of the insured dog population had developed pyometra by 10 years of age. In the three breeds at highest risk of developing

the disease (rough-haired Collie, Rottweiler, Bernese Mountain Dog), approximately 50% of the bitches had experienced pyometra before reaching 10 years of age (Hagman, 2004). Pyometra can be a life threatening, and expensive to treat, condition that occurs with much greater frequency than rupture of the cranial cruciate ligament or cardiac tumors, and can easily be prevented by ovariohysterectomy.

In summary, while I respectfully disagree with Dr. Zink as to the most appropriate time at which to gonadectomize the animal that is not used for breeding purposes, it is important for any veterinarian to base their decisions upon a well versed understanding of the scientific literature. As new studies are performed, and our knowledge base grows as to the effects, both good and bad, of sterilization of pet animals (including "early age" gonadectomy), current recommendations may (or may not) be changed. With regard to the canine athlete, I would encourage those who feel that they are seeing certain problems more frequently in animals that have undergone early age gonadectomy (as compared to traditional age gonadectomy) to collect, and analyze, data and contribute the information to the scientific literature. Until such studies are performed, anecdotal information remains just that – anecdotal, unverified, and unsuitable for making broad sweeping recommendations regarding the appropriateness of spaying and castrating (at any age) animals that are not used for breeding purposes (or for making recommendations regarding tubal ligation/vasectomy which clearly don't have the same health benefits as gonadectomy).

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Reference Point

Determining the optimal age for gonadectomy of dogs and cats

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Elective gonadectomy of dogs and cats, most commonly performed as an OHE of females and castration of males, is one of the most common veterinary procedures performed in the United States.[1] Increasingly, dog owners and members of the veterinary profession throughout the world have questioned the optimal age for performance of these surgeries or whether they should even be performed as elective surgeries. The objective for the information reported here was to provide a review of the scientific evidence, which could be used by veterinarians to counsel clients appropriately on this issue.

Traditional Age at Gonadectomy

Currently, most veterinarians in the United States recommend that elective gonadectomy be performed in dogs and cats at 6 to 9 months of age. However, there does not appear to be any scientific evidence to document that this is the optimal age. In fact, the age at which pets have traditionally been spayed and neutered has varied through the years and with geographic location. In the early 1900s, OHE was performed at 3 to 6 months of age and castration as early as 4 weeks of age.[2] Over time, the recommended age for elective gonadectomy of small animals increased to 6 to 9 months of age. It has been hypothesized that this was the result of an increasing popularity of dogs and cats as pets as American citizens found themselves with more disposable income, a subsequent desire by those pet owners for reproduction control in their animals, and the intent of veterinarians to provide the safest possible anesthesia and surgery for these new "family members." Despite great advances in anesthetic and surgical techniques and multiple studies that provide evidence for the safety of anesthesia and surgery in dogs and cats of younger ages, veterinarians in the United States still cling to the recommendation to perform gonadectomy at 6 to 9 months of age, with the added stipulation that bitches and queens should be spayed before their first estrus.

In some parts of the world, elective gonadectomy is considered unethical and is strongly discouraged or disallowed by professional veterinary associations.[2] Elective gonadectomy is illegal in at least 1 country.[3] In 1 article[4] published in Europe, elective gonadectomy is decried as "the tool of despots and tyrants throughout history," and the author of that article claims that gonadectomized dogs are "canine eunuchs, condemned to live their lives in a physical and mental twilight." That author also questions how a profession that publicly declares itself the guardian of animal welfare can, with impunity, perform elective surgery on animals for human convenience.[4]

Abbreviations

OHE	Ovariohysterectomy
TCC	Transitional cell carcinoma
CCL	Cranial cruciate ligament
FLUTD	Feline lower urinary tract disease
BPH	Benign prostatic hypertrophy-hyperplasia

Cultural and personal factors, including religious affiliation, ethnic background, intended working life of the animal, urban or rural location of the household, and literacy status, also may be associated with the likelihood that an owner will request gonadectomy for a pet.[5-7] Species and sex also play a role; in retrospective surveys, cats are more likely to be spayed or castrated than dogs, and bitches and queens are more likely to have undergone elective gonadectomy than stud dogs or tomcats.[6-9]

Surgical and anesthetic techniques for elective gonadectomy in dogs and cats of various ages are provided in the veterinary literature.[10-12] The reported incidence of postoperative complications in 1,016 dogs and 1,459 cats after elective surgery was 6.1% and 2.6%, respectively, with most of these considered minor problems, including inflammation at the incision site and gastrointestinal tract upset.[13] Complications were more common in dogs that underwent surgery when they were > 2 years of age.[13] In a study[14] in which investigators evaluated complications in 142 dogs undergoing OHE performed by fourth-year veterinary students, incidence of intraoperative complications was 6.3% and incidence of postoperative complications was 14.2%. Again, most of these were minor, including self-resolving hemorrhage and inflammation at the incision site and gastrointestinal tract upset. In that study,[14] the high incidence of postoperative complications was associated with an increase in surgery time, which was in turn positively correlated with increasing body weight of the animal. In studies[15-17] in which incidence of intraoperative and postoperative complications for elective gonadectomies performed at various ages was compared, the only com-

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plication associated with age at time of surgery was an increased incidence of postoperative infectious disease in dogs undergoing elective gonadectomy when they were < 12 weeks old. This may have been an artifact of the source from which dogs were recruited for the study.[17]

Societal Benefits of Elective Gonadectomy

The primary societal benefits of elective gonadectomy in dogs and cats are fewer animals relinquished to humane organizations and the fact that a specific animal's contribution to pet overpopulation is minimized. Multiple studies[9,18-20] have revealed that sexually intact dogs and cats are more likely to be relinquished to humane organizations than are those that are gonadectomized. In only 1 study[21] was it reported that there was an increased percentage of gonadectomized animals among those relinquished to humane organizations; animals in that study were relinquished for behavioral reasons, and it was considered likely that they had been gonadectomized as a possible treatment for behavioral problems, but with no subsequent improvement after surgery.

Millions of dogs and cats are euthanized at humane organizations annually in the United States, with estimates of 5.4 to 9.1 million dogs and 5.7 to 9.5 million cats euthanized in 1990.[22,23] Crude estimates of annual death rates in dogs and cats are 7.9% and 8.3%, respectively.[24] Statistics from humane organizations housing at least 100 animals/y, combined with these death rates, suggest that < 400,000 dogs and cats should be euthanized at humane organizations annually.[25] Not all animals euthanized at humane organizations are euthanized because of overpopulation[26]; however, the aforementioned study[25] indicates that > 2 million dogs and cats were euthanized at those shelters alone and substantiates the loss of animal life and stress to workers at humane organizations associated with overpopulation of dogs and cats in the United States.

Sexually intact animals adopted from humane organizations may be returned or may reproduce, both of which would repopulate those shelters. In 1 study,[8] 36.4% of relinquished animals were from unwanted litters. In a survey[24] of dog- and cat-owning households in the United States, 56% of 154 canine litters and 68% of 317 feline litters were unplanned. There is a lack of knowledge about reproduction among animal owners; the most common reason reported for the unplanned canine litters was that the owner did not know the bitch was in heat.[24] Up to 57% of bitch owners were unaware that bitches may cycle twice each year, up to 83% of cat owners were unaware that queens are seasonally polyestrous, and up to 61% of dog and cat owners were not certain or truly believed that their pet would be better if it had a litter before OHE was performed.[9,27,28]

Owners that adopt animals from humane organizations routinely sign a spay-neuter contract. However, compliance with such contracts is typically < 60%.[8,29] Up to 90% of veterinarians support mandatory gonadectomy of dogs and cats prior to adoption.[30] Few venues exist for educating veterinarians in early-age gonadectomy of dogs and cats, with most being self-taught.[30,31] Enhanced training of veterinarians in early-age gonadectomy and pediatric anesthetic techniques, mandatory gonadectomy of dogs and cats prior to adoption, and increased education of dog and cat owners about small animal reproductive physiology can only be of benefit in addressing these societal issues.

Benefits and Detriments of Elective Gonadectomy for Behavioral Concerns

Sexually dimorphic behaviors are those most commonly displayed by 1 sex, with mounting and urine spraying as primary examples.[32] Aggression may be a sexually dimorphic behavior. Most commonly, only those forms of aggression associated with the presence of females in estrus (aggression between females or between males housed with those females) are considered sexually dimorphic. Gonadectomy and the subsequent decrease in gonadal steroid hormones have been correlated with a decrease in sexually dimorphic behaviors.[18,33-37] Likelihood that gonadectomy will impact sexually dimorphic behaviors is not correlated with duration of the problem behavior and may or may not be associated with prior sexual experience of the affected animal.[35,36,38-41] Trainability of working dogs is not altered by gonadectomy and does not vary with age of the dog at the time of gonadectomy.[a]

Sexual behavior of male cats makes them extremely undesirable, and often unsafe, household pets.[42] A decrease in sexually dimorphic behaviors after castration of male cats is an extremely powerful benefit of elective gonadectomy. Sexual behaviors of queens, bitches, and stud dogs, although still possibly undesirable, are less commonly so severe as to make these animals untenable as household pets.

Nonsexually dimorphic behaviors are not typically affected by gonadectomy. One large-scale study[43] of dogs revealed a possible increase in noise phobias and decrease in separation anxiety and submissive urination associated with gonadectomy performed before the dogs were 5 months old.

An increase in reactivity toward humans with strange (unfamiliar) dogs and in aggression toward family members has been reported after OHE of bitches in several studies.[44-46] The reason for this possible tendency has not been defined but may be attributable to a decrease in estrogen and oxytocin concentrations, both of which may exert antianxiety effects in some species.[47] This tendency also may be a breed-specific phenomenon.

Cognitive function may be altered by gonadectomy. Comparison of the progression of cognitive dysfunction in sexually intact and castrated male dogs revealed a slowing of progression in sexually intact males.[48] Sample size was small in that study, with only 6 dogs in the sexually intact male group. Androgen deprivation has been associated with increased amyloid deposition in brains of humans and rodents and with decreased synapses in brains of rodents and nonhuman primates.[49] However, in a study[50] in which investigators directly examined brain tissue for DNA damage, a significantly greater percentage of neurons had extensive DNA damage in sexually intact Beagles than in castrated Beagles between 9 and 10.5 years of age.

Benefits and Detriments of Elective Gonadectomy for Various Conditions

Several conditions in dogs and cats can be impacted by elective gonadectomy, including neoplasia and orthopedic diseases. Knowledge of the benefits and detriments associated with elective gonadectomy enables veterinarians to provide the best counsel to clients and also to promote animal health.

Mammary gland neoplasms—Mammary gland neoplasms are the most common tumors of female dogs, with a reported incidence of 3.4%, and they are the third most common tumors of female cats, with a reported incidence of 2.5%.[51-55] Mammary gland neoplasms are the most common types of malignant tumors in dogs.[53] Mean percentage of mammary gland tumors in female dogs that are malignant is 50.9%.[53,56-58] In female cats, > 90% of mammary gland tumors are malignant.[53,59,60] Metastases are reported in up to 77% of dogs with mammary gland carcinomas, with the lungs being the site of metastasis in 30.8% of affected dogs.[61,62] In 1 study,[62] 59.7% of dogs in which a mammary gland tumor was diagnosed were euthanized at the time of diagnosis.

Increasing age and breed are risk factors for development of mammary gland neoplasms, with a mean age at diagnosis of approximately 10 years in dogs and cats.[52,63,64] Breeds reported to be at increased risk for developing mammary gland tumors include the Boxer, Brittany, Cocker Spaniel, Dachshund, English Setter, English Springer Spaniel, German Shepherd Dog, Maltese, Miniature Poodle, Pointer, Toy Poodle, and Yorkshire Terrier. Cat breeds reported to be at increased risk of tumor development are the Japanese domestic breeds and Siamese (**Table 1**).[52,64,65]

Maintenance of sexually intact status is a major risk factor for development of mammary gland tumors in dogs and cats.[60,66] Overall, sexually intact dogs and cats have 7 times the risk of developing mammary gland neoplasms when they get older, compared with the risk for spayed dogs and cats.[67] Compared with the incidence in sexually intact dogs, dogs spayed before their first estrus have a 0.5% risk, dogs spayed after 1 estrus have an 8.0% risk, and dogs spayed after 2 estrous cycles have a 26.0% risk of developing mammary gland neoplasms when they get older.[68] However, performing an OHE may even have a substantial sparing effect in older dogs, with a reduced but still evident reduction for mammary gland neoplasms in dogs spayed as late as 9 years of age.[69]

An exact cause-and-effect relationship between sexually intact status and mammary gland neoplasia has not been defined. Estrogen and progesterone have direct and indirect stimulatory effects on mammary gland tissue, and receptors for both hormones have been identified in normal and neoplastic mammary gland tissues.[69-71] In 1 report,[69] it was suggested that mammary gland neoplasms may be more likely to develop in bitches that had overt pseudopregnancy more than 3 times during their life, which would support the hypothesis that there is a hormonal effect or a direct effect of malignant transformation of metabolically active mammary gland tissue.

Prostatic neoplasms—The reported incidence of prostatic tumors in dogs is 0.2% to 0.6%, and prostatic neoplasms in dogs are almost always malignant adenocarcinomas.[72-74] There is neoplastic differentiation in tissues of ductal or urothelial origin, which are androgen-independent tissues.[75] However, castrated dogs are at an increased risk for development of prostatic neoplasms, with the increase in risk ranging from 2.4 to 4.3 times that of sexually intact male dogs (**Table 2**).[72,74-76] Mean age of dogs at diagnosis is approximately 10 years, with slightly younger dogs having prostatic adenocarcinoma with metastases to bones.[74,77,78] An exact cause-and-effect relationship has not been defined, but it has been suggested[75] that deprivation of androgens does not act to initiate neoplasia; rather, androgen deprivation permits progression of disease.

Other types of tumors—Testicular tumors are the second most common tumor type in dogs, with a reported incidence of 0.9%.[b] Mean age of dogs at diagnosis is approximately 10 years.[63,64,79] Most tumors are readily diagnosed during physical inspection. Malignancy is considered low for all types of testicular tumors; therefore, castration is curative.[80]

Ovarian and uterine tumors are uncommon in dogs and cats. Although malignant tumors of both tissues have been reported, metastasis is rare and OHE is curative in most situations.[81-84]

Table 1—Benefits and detriments of OHE for various conditions in female cats.

Condition	Incidence	Substantial morbidity?	Specific breeds at risk?
Benefits			
Mammary gland neoplasms	2.5% in all cats; greatly reduced when spayed before first estrus	Yes	Yes*
Ovarian or uterine tumors	Low	No	No
Pyometra	Increases with age	No	No
Detriments			
Complications of surgery	2.6%	No	No
Obesity	High	No	No
FLUTD	0.6%	No	No
Diabetes mellitus	0.5%	No	Yes†

*Japanese domestic breeds and Siamese. †Burmese.

Table 2—Benefits and detriments of gonadectomy for various conditions in male dogs.

Condition	Incidence	Substantial morbidity?	Specific breeds at risk?
Benefits			
Testicular neoplasms	0.9%	No	No
BPH or prostatitis	75%–80% by 6 years of age	No	No
Detriments			
Complications of surgery	6.1%	No	No
Prostatic neoplasms	0.2%–0.6%	Yes	No
TCC	< 1%	No	Yes*
Osteosarcoma	0.2%	Yes	Yes†
Hemangiosarcoma	0.2%	Yes	Yes‡
CCL rupture	1.8%	Yes	Yes§
Obesity	2.8%	No	Yes‖
Diabetes mellitus	0.5%	No	Yes¶

*Airedale Terrier, Beagle, Collie, Scottish Terrier, Shetland Sheepdog, West Highland White Terrier, and Wire Fox Terrier. †Doberman Pinscher, Great Dane, Irish Setter, Irish Wolfhound, Rottweiler, and Saint Bernard. ‡Boxer, English Setter, German Shepherd Dog, Golden Retriever, Great Dane, Labrador Retriever, Pointer, Poodle, and Siberian Husky. §Akita, American Staffordshire Terrier, Chesapeake Bay Retriever, German Shepherd Dog, Golden Retriever, Labrador Retriever, Mastiff, Neapolitan Mastiff, Newfoundland, Poodle, and Saint Bernard. ‖Beagle, Cairn Terrier, Cavalier King Charles Spaniel, Cocker Spaniel, Dachshund, Labrador Retriever. ¶Airedale Terrier, Cocker Spaniel, Dachshund, Doberman Pinscher, Golden Retriever, Irish Setter, Miniature Schnauzer, Pomeranian, and Shetland Sheepdog.

The most common tumor of the urinary tract of dogs is TCC of the bladder.[85-88] Overall incidence of TCC in dogs is reported to be, at most, 1% of all malignant tumors.[89] Breeds at increased risk for development of a TCC include the Airedale Terrier, Beagle, Collie, Scottish Terrier, Shetland Sheepdog, West Highland White Terrier, and Wire Fox Terrier (**Table 3**).[90] Gonadectomized animals have a risk for development of TCC approximately 2 to 4 times that of sexually intact animals.[85,86] An exact cause-and-effect relationship has not been defined.

Osteosarcoma is a highly malignant tumor, with a reported incidence of 0.2%.[91] Risk of development of osteosarcoma increases with age and may increase with increasing body weight.[91,92] Breeds reported to be at increased risk for development of an osteosarcoma include the Doberman Pinscher, Great Dane, Irish Setter, Irish Wolfhound, Rottweiler, and Saint Bernard.[91,93] In 1 study[92] in which historical data that consisted of owners' assessments of body condition score and body weight were used for analysis, incidence of osteosarcoma was not correlated with body weight. However, owner assessment of body condition score is poorly correlated with veterinarian assessment of body condition score.[94]

Gonadectomy can increase the risk of development of osteosarcoma by 1.3 to 2.0 times.[91,95] In 1 study[92] in which investigators evaluated 683 purebred Rottweilers, there was a significant increase in the incidence of osteosarcoma in female and male dogs that had undergone gonadectomy when < 1 year of age; however, the overall incidence of osteosarcoma in this population of dogs was much higher than that in the general population, which suggested a hereditary component. Furthermore, life span of dogs did not differ (mean ± SD life span of sexually intact and castrated male dogs was 9.3 ± 2.5 years and 9.2 ± 2.5 years, respectively) or was noticeably increased (mean life span in sexually intact and spayed female dogs was 7.5 ± 2.4 years and 9.8 ± 2.4 years, respectively) in gonadectomized dogs.[92] An exact cause-and-effect relationship has not been defined.

Hemangiosarcoma is the most common cardiac tumor in dogs, with a reported incidence of 0.2%.[96] Breeds at increased risk for development of hemangiosarcoma include the Boxer, English Setter, German Shepherd Dog, Golden Retriever, Great Dane, Labrador Retriever, Pointer, Poodle, and Siberian Husky, with large breeds (in general) at increased risk, compared with the risk for small breeds.[97] For both cardiac and splenic hemangiosarcoma, relative risk is increased for gonadectomized animals, with spayed females reportedly having 2.2 times the risk of splenic hemangiosarcoma and 5 times the risk of cardiac hemangiosarcoma, compared with the risk for sexually intact females, and castrated males having 2.4 times the risk, compared with the risk for sexually intact males.[96,98] An exact cause-and-effect relationship has not been defined.

Orthopedic abnormalities—Postmenopausal women or those who have undergone OHE have explicit concerns about osteoporosis. However, there is no decrease in mineral density of bone in dogs after OHE.[99-101]

Timing of closure of the physes of long bones is controlled in part by gonadal hormones. In both dogs and cats, gonadectomy at any age prior to physeal closure delays that closure and is associated with statistically significant, although not readily visible or clinically relevant, lengthening of associated long bones.[34,102-106] However, no specific correlation has been found between age at gonadectomy and incidence of long-bone fractures, including physeal fractures.[35] In 1 study,[107] there was an increase in the incidence of capital physeal fractures in the femurs of castrated male cats; however, the cats with fractures were also overweight.

Table 3—Benefits and detriments of OHE for various conditions in female dogs.

Condition	Incidence	Substantial morbidity?	Specific breeds at risk?
Benefits			
Mammary gland neoplasms	3.4% in all dogs; greatly reduced when spayed before first estrus	Yes	Yes*
Ovarian or uterine tumors	Low	No	No
Pyometra	15.2% by 4 years of age; 23% to 24% by 10 years of age	Yes	Yes†
Detriments			
Complications of surgery	6.1%	No	No
Aggression	Variable	Potentially	Yes‡
TCC	< 1%	No	Yes§
Osteosarcoma	0.2%	Yes	Yes‖
Hemangiosarcoma	0.2%	Yes	Yes¶
CCL rupture	1.8%	Yes	Yes#
Obesity	2.8%	No	Yes**
Diabetes mellitus	0.5%	No	Yes††
Urinary incontinence	4.9%–20.0%; increased when spayed at < 3 months of age	No	Yes‡‡

*Boxer, Brittany, Cocker Spaniel, Dachshund, English Setter, English Springer Spaniel, German Shepherd Dog, Maltese, Miniature Poodle, Pointer, Toy Poodle, and Yorkshire Terrier. †Bernese Mountain Dog, Cavalier King Charles Spaniel, Chow Chow, Collie, English Cocker Spaniel, Golden Retriever, Rottweiler, and Saint Bernard. ‡English Springer Spaniel. §Airedale Terrier, Beagle, Collie, Scottish Terrier, Shetland Sheepdog, West Highland White Terrier, and Wire Fox Terrier. ‖Doberman Pinscher, Great Dane, Irish Setter, Irish Wolfhound, Rottweiler, and Saint Bernard. ¶Boxer, English Setter, German Shepherd Dog, Golden Retriever, Great Dane, Labrador Retriever, Pointer, Poodle, and Siberian Husky. #Akita, American Staffordshire Terrier, Chesapeake Bay Retriever, German Shepherd Dog, Golden Retriever, Labrador Retriever, Mastiff, Neapolitan Mastiff, Newfoundland, Poodle, and Saint Bernard. **Beagle, Cairn Terrier, Cavalier King Charles Spaniel, Cocker Spaniel, Dachshund, and Labrador Retriever. ††Airedale Terrier, Cocker Spaniel, Dachshund, Doberman Pinscher, Golden Retriever, Irish Setter, Miniature Schnauzer, Pomeranian, and Shetland Sheepdog. ‡‡Boxer, Doberman Pinscher, Giant Schnauzer, Irish Setter, Old English Sheepdog, Rottweiler, Springer Spaniel, and Weimeraner.

Hip dysplasia is a hereditary condition in dogs that affects females and males with equal frequency and can be controlled (to some extent) by environmental factors, including diet.[108-111] The reported incidence of hip dysplasia is 1.7%, with an increased incidence in large- and giant-breed dogs, most particularly in the Chesapeake Bay Retriever, English Setter, German Shepherd Dog, Golden Retriever, Labrador Retriever, Samoyed, and Saint Bernard breeds.[112] In 1 large study[43] of 1,842 dogs, there was an increased incidence of hip dysplasia in dogs spayed or castrated prior to 5 months of age; however, it was not clear whether the diagnosis of hip dysplasia was confirmed by a veterinarian in all affected dogs.

Rupture of the CCL is more common in women than in men and may be more likely to occur during certain phases of the menstrual cycle, which suggests a hormonal effect on joint stability.[113] Dog breeds reported to be at increased risk of CCL rupture include the Akita, American Staffordshire Terrier, Chesapeake Bay Retriever, German Shepherd Dog, Golden Retriever, Labrador Retriever, Mastiff, Neapolitan Mastiff, Newfoundland, Poodle, Rottweiler, and Saint Bernard.[114,115] Reported incidence of CCL rupture is 1.8%, and it reportedly is more prevalent in gonadectomized female and male dogs than in sexually intact dogs.[115-117] An exact cause-and-effect relationship has not been defined, but heredity plays a role in the predisposition toward CCL injury, as might body weight and body condition score. To my knowledge, there have been no studies for which the results would implicate alterations in physeal closure with subsequent asynchrony of long-bone growth and abnormalities in joint formation as a cause of CCL rupture in dogs.[115,118]

Obesity—Obesity is the most common nutritional disorder of dogs and cats, with a reported incidence of 2.8% among the entire dog population.[119] It is a multifactorial problem. Risk factors include breed, with an increased incidence of obesity in Beagles, Cairn Terriers, Cavalier King Charles Spaniels, Cocker Spaniels, Dachshunds, and Labrador Retrievers; housing; increasing age[6]; ownership by an overweight person or a person ≥ 40 years old; and, possibly, sex of the dog.[94,119-122]

The most commonly reported risk factor for obesity is gonadectomy, with spayed or castrated dogs and cats much more commonly designated by veterinarians as being overweight or obese, compared with the weight designations for sexually intact animals.[33,121-127] In 1 study,[128] 34% of castrated male and 38% of spayed female dogs were considered overweight or obese. It is unclear whether age at the time of gonadectomy has an effect on subsequent obesity. Studies[34,102,103] in dogs failed to detect differences in food intake, body weight, or depth of back fat when comparing dogs gonadectomized at 7 or 8 weeks of age and dogs gonadectomized at 7 months of age. A retrospective study[43] of 1,842 dogs revealed a decrease in the incidence of obesity in dogs gonadectomized prior to 5 months of age when compared with those gonadectomized at > 5 months of age. Similarly, although cats are more likely than dogs

to become obese after gonadectomy, no correlation has been found between age at gonadectomy and final body weight or amount of body fat.[34]

Metabolic rate decreases after gonadectomy in cats.[125,126] A cause-and-effect relationship between gonadectomy and obesity in dogs is less clearly defined. Spayed female dogs have an increase in food intake and increase in indiscriminate appetite after OHE, compared with those of sham-operated or age-matched control dogs.[44,129] Estrogen may act as a satiety factor, which would explain these changes.[122] This does not address the correlation between obesity and castration in male dogs. In both dogs and cats, obesity is not a mandatory consequence of gonadectomy; instead, it is controllable with an appropriate diet, feeding regimen, and exercise regimen.[130]

Urinary tract disorders—Spayed female dogs reportedly have an increased risk of developing urinary tract infections.[43,131] A cause-and-effect relationship has not been defined.

Female dogs spayed before onset of puberty may be more likely to maintain a juvenile or recessed vulva. In 1 study,[104] bitches spayed at 7 weeks of age had a vulva with a more immature appearance, compared with the vulva in bitches spayed at 7 months of age. It is the author's experience that bitches spayed as adults will have vulvar atrophy, which achieves the same result. A juvenile vulva in an otherwise healthy dog is of no clinical relevance. Overweight bitches with a recessed vulva, especially those with concurrent urinary incontinence, are more likely to develop perivulvar dermatitis.

Male dogs castrated at 7 weeks of age had less penile development than did dogs castrated when they were older.[102] Male cats castrated before onset of puberty may have a decreased ability to extrude the penis.[132,133] Clinical relevance of this phenomenon is not known.

Feline lower urinary tract disease is a syndrome consisting of hematuria, dysuria or pollakiuria, and possible urethral obstruction and is most commonly classified as idiopathic. The reported incidence of FLUTD is 0.6%.[134] Despite numerous vehemently declared anecdotes of an increase in the incidence of urethral obstruction in male cats castrated when young, numerous studies[35,132,135] have failed to detect a correlation between gonadectomy of cats at any age and a decrease in diameter of the urethra or an increase in incidence of FLUTD, with or without urethral obstruction. In 1 large study,[136] investigators identified gonadectomy as a risk factor for development of FLUTD in both female and male cats and also identified an increased risk of development of FLUTD in overweight or obese cats. In that study, sexually intact female cats had a relatively reduced risk for development of FLUTD.

Urethral sphincter mechanism incompetence, formerly known as estrogen-responsive urinary incontinence, is a common problem of spayed female dogs.[137-139] The condition is evident with equal frequency in ovariohysterectomized or ovariectomized female dogs, with the reported incidence ranging from 4.9% to 20.0%.[43,138-140] Studies[17,141] have failed to detect a correlation between age at time of OHE and likelihood of developing incontinence. In a study[43] of 983 female dogs, bitches were significantly less likely to develop incontinence when spayed at > 3 months of age. Other risk factors include body weight, with dogs weighing ≥ 20 kg (44 lb) at increased risk; breed, with Boxers, Doberman Pinschers, Giant Schnauzers, Irish Setters, Old English Sheepdogs, Rottweilers, Springer Spaniels, and Weimeraners at increased risk and Labrador Retrievers at decreased risk in European studies; and urethral length or resting position of the urinary bladder.[137,140,142-145] An exact cause-and-effect relationship has not been defined, with research currently focusing on altered gonadotropin secretion after gonadectomy.[146-150] Typically, urethral sphincter mechanism incompetence is easily controlled with medical treatments.

Adrenal gland disease—To the author's knowledge, there are no reports of an increase in the incidence of adrenal gland disease associated with sexually intact status in dogs and cats. In the United States, almost all ferrets are gonadectomized when extremely young; the incidence of adrenal gland disease in ferrets is higher in the United States than in European countries where ferrets are not routinely spayed or castrated.[151,152] In 1 study[152] in Europe, a correlation was detected between age at gonadectomy and age at onset of adrenal gland disease, with ferrets gonadectomized at a younger age having clinical signs of adrenal gland disease earlier in life. Sexually intact ferrets also have adrenal gland disease.[153] Possible causes for this include lack of down-regulation of sex steroids or an increase in circulating concentrations of gonadotropins that causes adrenal gland hyperplasia and possibly contributes to neoplastic transformation.[154-156]

Pyometra—Incidence of pyometra in dogs and cats in the United States has not been reported, perhaps because of the prevalence of OHE in these species before they reach an age when they would be likely to develop pyometra. In other countries, 15.2% and 23% to 24% of bitches developed pyometra by 4 and 10 years of age, respectively.[157,158] Pyometra is more common in nulliparous bitches than in bitches with a history of carrying a pregnancy successfully to term.[158,159] There is a significant likelihood that cats will have clinical evidence of uterine disease when queens reach 5 years of age.[160] Dog breeds reported to be at increased risk of developing pyometra include the Bernese Mountain Dog, Cavalier King Charles Spaniel, Chow Chow, Collie, English Cocker Spaniel, Golden Retriever, Rottweiler, and Saint Bernard.[158,159] In animals with pyometra, OHE is curative, with reported mortality rates of 0% to 17% in dogs and 8% in cats.[161,162]

Nonneoplastic prostatic disease—Benign prostatic hypertrophy-hyperplasia is a common disorder in sexually intact male dogs. In 1 study,[163] investigators evaluated male dogs. Of 300 sexually intact male dogs, 231 (63.4%) had BPH; all castrated male dogs in that study had profound prostatic atrophy. Development of BPH is positively correlated with age.[164-166] By 2.4 years of age, half of all sexually intact dogs will have histologic or clinical evidence of BPH, with the incidence increasing to 75% to 80% by 6 years of age and 95% to 100% by 9 years of age.[164,166,167] In addition, BPH predisposes dogs to prostatitis.[168] Neither BPH nor prostatitis is commonly associated with substantial morbidity, and

castration is an integral part of the treatment of both conditions.[169,170]

Endocrine disorders—The reported incidence of diabetes mellitus in dogs is 0.5%.[171] Risk factors include breed, with Miniature Poodles, Miniature Schnauzers, Pugs, Samoyeds, and Toy Poodles at increased risk; sex, with female dogs more commonly affected than male dogs; and increasing age.[171,172] In 1 study,[172] a possible increase in the risk of developing diabetes mellitus was detected in castrated male dogs; however, it was not defined whether this could have been associated with obesity in these animals. In cats, the reported incidence of diabetes mellitus is 0.4% and risk factors include breed, with Burmese cats at increased risk; sex, with males at increased risk; and increasing age.[173-175] Gonadectomized male and female cats have an increased risk, with gonadectomized cats having 8.7 times greater odds of developing diabetes mellitus than for sexually intact cats.[173,174]

The incidence of hypothyroidism in dogs is 0.2% to 0.3%.[176,177] A breed predisposition has been described for the Airedale Terrier, Cocker Spaniel, Dachshund, Doberman Pinscher, Golden Retriever, Irish Setter, Miniature Schnauzer, Pomeranian, and Shetland Sheepdog breeds.[176,177] Those studies[176,177] have revealed an increased risk of development of hypothyroidism for spayed female and castrated male dogs, compared with the risk for sexually intact dogs. A cause-and-effect relationship has not been defined. Hypothyroidism typically is easily controlled with medical treatment.

Life span—Life expectancy at birth for women in the United States is 80.4 years, whereas that for men is 75.2 years.[178] Results for dogs vary,[179-181] with females living longer than males in some studies and the reverse being found in other studies. Negative correlations have been detected between body weight and longevity and between height and longevity in dogs.[182] Several studies[179-181] have revealed an increase in longevity for gonadectomized animals when compared with that for sexually intact animals. In sockeye salmon, life span is significantly longer in fish castrated before gonadal development.[183] Results of these studies argue against the evolutionary theory, which holds that it is not prudent for a population to carry individuals that have aged past reproductive usefulness.[30] In dogs and cats, this may be a reflection of enhanced care of animals by owners who have made the investment of surgery or a decrease in risk-associated behaviors (such as roaming) in gonadectomized animals.

Conclusions

How does a veterinarian reconcile all of these data to make the best possible recommendation regarding optimal age at which to neuter male and female dogs and cats? The author provides the following assertions:

- Animals housed at humane societies should be treated as a population. Societal benefit resulting from gonadectomy of unowned dogs and cats in the United States outweighs all other concerns. Male and female dogs and cats should be spayed or castrated before being offered for adoption by humane organizations.
- Pets should be considered individually, with the understanding that for these pets, population control is a less important concern than is health of each animal. Dogs and cats should be maintained as household pets. Responsible owners should ensure that their pets are provided appropriate and regularly scheduled veterinary care.
- The behavior of most sexually intact male cats makes them undesirable or dangerous as pets. Because castration substantially reduces these sexually dimorphic behaviors, it is recommended that all male cats not intended for breeding be castrated prior to puberty and that all breeding males be castrated as soon as their use as a breeding male has ceased.
- For female cats and male and female dogs, veterinarians and owners must consider the benefits and detriments of gonadectomy for each animal (Tables 1–3). Factors to be considered include incidence of various conditions associated with gonadectomy; degree of morbidity, with substantial morbidity defined as a condition prevalent in > 1% of the population, associated with > 50% of the malignancy or mortality rates, or not easily controlled by noninvasive treatments or good husbandry; breed; and intended working or breeding life of each animal.

As an example, consider a discussion between a veterinarian and the owner of an 8-week-old female Labrador Retriever that is not intended for breeding. This dog would benefit greatly from OHE before her first estrus as a means of preventing mammary gland tumors, which are extremely common and cause substantial morbidity (Table 3). Because of her breed, detriments of OHE include an increased predisposition to CCL injury, hemangiosarcoma, and obesity. However, there is a low incidence of hemangiosarcoma, and obesity can be readily controlled with good husbandry, which leaves CCL injury as the most important possible detriment. Because the incidence of CCL rupture is lower than that of mammary gland neoplasia, a veterinarian may choose to recommend OHE and educate the owner about maintenance of optimal body condition and other management techniques that will minimize potential for CCL injury. An OHE should be performed before the dog's first estrus. To minimize the potential for development of urinary incontinence, the veterinarian may choose to wait to perform the OHE until after the dog has reached 3 months of age.

The information provided here on the risks and detriments of gonadectomy is not intended to promote or to minimize the importance of gonadectomy as a means of controlling animal populations or possible impacts on animal health or behavior of a specific animal. The veterinary profession recognizes the need for individual assessment of risk and benefit when evaluating vaccination protocols for animals. Elucidation of the genome in various species may lead to individualized diagnostic and treatment plans for each animal in the future. It behooves us as veterinarians dedicated to the provision of the best possible care for animals to educate clients and evaluate each animal carefully when making recommendations regarding gonadectomy.

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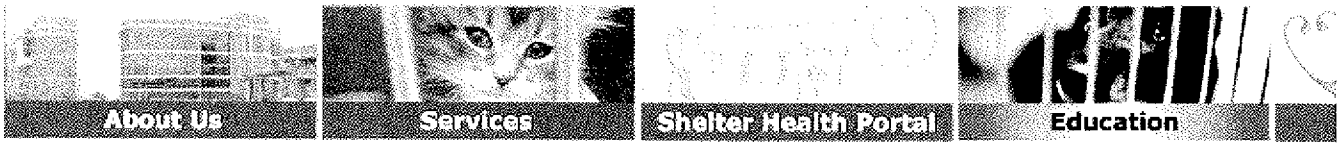

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Library Club

Welcome to the UC Davis on-line Journal club library.

As part of our commitment to resident training and to our mission to advance shelter me specialty field, members of the shelter medicine team along with local shelter veterinaria students enrolled in the school of veterinary medicine meet weekly to discuss journal art relevance to animal sheltering In addition to reviewing recently published articles the gro current issues -both local and national- facing sheltering professionals.

Recently we have acquired technology which allows residents in training at other institut other leading shelter experts to join our weekly meeting making our get together truly a i affair. Ultimately the shelter medicine program would like to acquire the equipment nece us to conduct video conferences with shelter medicine residents and researchers from a United States. Having the ability to meet "face to face" via video conferencing with other professionals will undoubtedly accelerate the rate at which issues plaguing shelter anim addressed and will contribute to the development of a diplomatic core of Board Certified Medicine specialists.

The shelter medicine program is currently in need of donations to cover the cost of the v conferencing equipment. If you or someone you know is interested in making a donatior purchase of this equipment please contact Mike Bannasch .

Below please find the listing of the articles discussed during shelter medicine rounds. To abstract of the article discussed (if available) clicking on the title of the article will take yo PubMed site. From there you can find out how to contact the publisher of the article if yo purchase the entire article. Or you can contact your nearest library to find out how you c entire article.

ARTICLE REVIEW

Benefits/Risks of Early-age Gonadectomy in Cats and Dogs, JAVMA Vol 224, No. 3

This study followed dogs and cats who were spayed at an early age (< 5.5 months) vs. t (5.5 months to12 months), for up to 11 years after surgery (median 3.9 years for cat, dog). The study evaluated retention in home (> 3 months), mortality, medical and behav Questionnaire and veterinary records were utilized for evaluation (Dogs, n=1842; Cats, i study determined associations and correlations between age of neuter and the aforemei conditions. Although the researchers looked at confounding (interfering) variables, reme correlation does not always indicate causation.

Benefits to early age spay/neuter

1. Population control (spay/neuter before puberty)
2. More rapid anesthetic recovery and fewer complications (7 weeks vs. 7 months)

CATS
Conditions with increased risk (for traditional age gonadectomized cats)

return to top

1. Abscesses (males)
2. gingivitis
3. asthma[b]
4. hyperactivity[a,b]
5. aggression toward veterinarians (males)[a]
6. Urine spraying (males)
7. Sexual behaviors (males)[a]

Conditions with increased risk (for early age gonadectomized cat)

1. shyness around strangers[a]
2. hiding frequently (males, related to increased relinquishment) [a,b]

No effect (cat): scratching furniture, mortality rate, relinquishment rate, obesity, FLUTD, obstruction, aggression toward people, allergic skin disease, cardiac conditions, excessi hepatic disease, hyperthyroidism, inappropriate elimination, inflammatory bowel disease pica, psychogenic alopecia, upper respiratory infections, aggression toward other cats, t playfulness, and time slept each day, eosinophilic inflammatory conditions, fight or bite v car, lacerations, repeat infections, and soft tissue injuries or lamenesses

Unable to evaluate (occurrence too low): arthritis, balanoposthitis, chronic gastroenteriti failure, diabetes mellitus, FeLV, FIP, FIV, long-bone fractures, pneumonia, urolithiasis, a

[a] no significant difference when considered a serious problem
[b]significant at p< .01

DOGS
Conditions with increased risk (for traditional age gonadectomized dog)

1. Escaping[1,2]
2. Overweight body condition
3. Separation anxiety[2]
4. Urination in house when frightened[2]

Conditions with increased risk (for early age gonadectomized dog)

1. Urinary incontinence (female, 12.9% of dogs spayed <3 months vs. 5% of dogs s months, not associated with increased rate of relinquishment)
2. Hip dysplasia (incidence 6.7% early vs. 4.7% traditional: > 5.5 months had 3 tim euthanasia for hip dysplasia)
3. Cystitis (female- not chronic)
4. Aggression toward household members (male, associated with increased risk of
5. Barking (male, at visitors, bothersome barking)
6. Noise phobia
7. Sexual behaviors
8. Urination when frightened
9. Parvovirus (within first week after adoption)

No effect (dog): mortality rate, acariasis, allergic skin disease, balanoposthitis, cardiac d fractures, hyperactivity, hypoadrenocorticism, hypothyroidism, neoplasia, aggression tov destructive behavior, digging, excessive licking/chewing skin, playful behavior, shyness, aggression toward veterinarian, food allergy, demodicosis, fight-bite wounds, gingivitis, i kennel cough, intervertebral disk disease, lacerations, orthopedic problems of the stifle j

dermatitis, pica, pyoderma, repeat infections, soft tissue injuries

Unable to evaluate (occurrence too low, dog): autoimmune disorders, chronic renal failu mellitus, hepatic disease, mammary neoplasia, pancreatic disorders, parvovirus inciden of age, patellar luxation, urolithiasis

[1]when considered a serious problem

[2] associated with increased rate of relinquishment

[3] traditional-age gonadectomy were more likely to be eliminated from the study due to tl aggression screening, thus this parameter may be inaccurate

ARTICLE REVIEW

Sokolow, S.H., et al.,*Epidemiologic evaluation of diarrhea in dogs in an animal shelter. A Journal of Veterinary Research*, 2005. *66*(6): p. 1018-1024.

The objective is stated in the abstract, but more specifically, GIS was used in order to de spatial distribution of diarrhea cases in the shelter was random or not.

The study had a case-control design. We felt that this design was appropriate to answe but that it also had certain limitations. For example, a case-control design tends to ove acute conditions, cases of which may be rapidly removed from the population. In this c as a cause of diarrhea may have been underestimated, since at this shelter dogs with p usually be euthanized as soon as they were detected by shelter staff.

A cohort design, in which dogs would be tested for pathogens upon admission to the sh followed to evaluate which developed diarrhea, would have been able to answer certain For example, the paper concluded that the high prevalence of highly contagious pathog canine coronavirus (CCV) indicates an almost unhindered spread of infection throughou population. However, the prevalence of CCV is unknown in dogs entering the shelter. I prevalence is equally high, this could negate the paper's conclusion. We recognize, ho conducting a cohort study in this shelter would be very challenging.

Also with respect to potential intra-shelter spread of the pathogens that were evaluated i the prepatent period should also be considered. For example, the prepatent periods fo (*Ancyclostoma caninum*) and Isospora spp. are about two weeks , while that of *T. car* approximately 1 month . Whipworms (*Trichuris vulpis*) have a very long prepatent per months . Most dogs in this shelter are housed there for a relatively short time (most like two weeks), so one would not expect to see clustering of cases due to intra-shelter trans these pathogens.

The matching of cases and controls in this study was done based on spatial location. It that this would result in approximate matching on the basis of age, sex and adoption rea because it was believed that animals that were similar in these respects tended to be hc in the shelter. However, our experience at the shelter where this study was conducted this is often not the case. Dogs up for adoption are often mixed with strays, and puppie housed with adult dogs (usually small dogs, therefore making it likely that cases and cor matched on size more than age.)

We found it puzzling that the ages of any of the dogs in the study were hardly mentione The authors state that age, among other factors, was recorded at the time of sample col acknowledge that specific characteristics of individual dogs, such as BCS and time in th often not known, and that the cohousing of dogs limited the ability to identify individual d diarrhea. However, no other mention of age is made. Based on our experience in she the ages of the cases and controls, and the ages of dogs testing positive for certain patl be relevant to our practice as shelter vets. In many shelters, deworming protocols for p different from those for adult dogs, and it would be helpful to know if the data from this s support for this approach.

We also wondered if age may have caused an overestimation of the association betwee and diarrhea. It is known that puppies are predisposed to intestinal roundworm infectio

adults. If it is also true that puppies are generally more prone to diarrhea than are adult suspect but don't know for certain), than the association between roundworms and diarr been overestimated. That is, the two conditions may just appear to be associated beca happen to occur more frequently in puppies. If adults are analyzed separately, roundw diarrhea may not show an association.

Questions were raised regarding the true zoonotic risk of some of the pathogens tested. introduction of the paper states that many canine GI pathogens pose a zoonotic risk to h listed whipworms (*Trichuris vulpis*) and *Strongyloides stercoralis* among other example of our knowledge, whipworms do NOT pose a zoonotic risk. In addition , *Toxocara can* cause visceral larval migrans in humans, was not listed in the author's lists of zoonotic p

There was some discussion of the risk of giardia being passed from dogs to humans, bu conclusion was reached. Points made included that giardia has a very low infective do species of giardia that commonly infects humans may not be G. lamblia, and the lack of giardia in dogs poses a zoonotic risk. It was suggested that screening for giardia be do shelter dogs, but using either a snap ELISA or DFA rather than fecal flotation.

The paper's suggestion that all shelter dogs be screened for *Campylobacter* however, w impractical and perhaps unnecessary. While the study showed that dogs with diarrhea likely to test positive for *C. jejuni* than were dogs without diarrhea (OR=10), the CI for thi wide (1.42 to 433.4) and almost includes one, so this statistic may not be very significan prevalence of *C. jejuni* in the general canine population is not given. Unless the prevale is significantly higher in shelter dogs, screening for this pathogen in shelters is likely unv

This study may serve as a useful reference to members of the UC Davis Koret Shelter M Program as we evaluate the prevalence of zoonotic GI pathogens in dogs transported o affected by Hurricanes Katrina and Rita. Concern that these dogs may harbor particula of zoonotic pathogens resulted in some opposition to their shipment. The survey of the zoonotic pathogens in typical' dogs in California municipal shelters provided in this study a useful comparison to dogs relocated after the Hurricanes.

Submitted by Barb Jones, Resident, UC Davis Koret Shelter Medicine Program

NO MANDATORY SPAY NEUTER LAW!!! GO NO KILL.

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Submitted at City Council
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MANDATORY SPAY NEUTER LAWS FAIL EVERYWHERE

Mandatory Spay Neuter laws across America have led to

- **more animals killed**
- **more animals impounded**
- **increased animal control costs**
- **decreased licensing revenues**

Santa Cruz County, California

1995 mandatory spay/neuter ordinance change in shelter intakes and euthanasia rates are no better than the state average

- Animal control costs doubled after passage
- Animal control costs "spiraling" out of control, according to a Santa Cruz Sentinel investigation
- Capitola, CA canceled animal services contract with county due to rising costs
- Watsonville threatening to pull out due to rising costs
- Licensing compliance dropped significantly

Supporters of AB 1634 frequently claim that Santa Cruz County had a 50+% reduction in shelter intakes after imposed mandatory spay/neuter in 1995. This is not true. The official shelter data published by California's Department of Health Services (CDHS), County of Santa Cruz budgets per State Controller County Budget Act, show the annual budget for 1990 $626,322, 1993 $642,498. In 1995, the MSN law was passed. From 1995 to 2002, the annual budget increased from $647,742 with an average increase of $52,454 annually, for a 2007 budget of 1,329,637. http://www.naiaonline.org/pdfs/SC budget.pdf

Los Angeles, California

In 2000, after passing the mandatory Spay or Pay ordinance, the LA County saw:

- A decline in licensing compliance.
- Animal control budget rose 269%, from $6.7 million to $18 million.
- City hired additional animal control officers and bought new trucks and equipment just to enforce the new law

Montgomery County, Maryland

- Mandatory spay/neuter law was passed but later repealed as a failure.
- 50% decline in licensing compliance while ordinance in effect.
- Euthanasia rates declined more slowly than before the ordinance passed.

Fort Worth, Texas

- Ended its mandatory spay/neuter program
- licensing compliance fell off after passage of the ordinance.
- There was a reduction in rabies vaccinations which lead to an increase in rabies in the city.

King County, Washington

1992 mandatory spay/neuter ordinance

- License compliance decreases since passage of the ordinance.
- Animal control expenses increased 56.8% and revenues only 43.2%
- In 1990 animal controls were $1,662,776. By 1997 animal control costs were $3,087,358.
- Euthanasia rates fell at a slower rate after passage of the ordinance.
- King County, WA is commonly held up by supporters as an example of MSN success. These two articles by Nathan Winograd (www.Bestfriends.org) illustrate how MSN supporters spin data. http://nathanwinograd.blogspot.com/2007/09/truth-about-king-county.html

Aurora, Colorado

- mandatory spay/neuter ordinance
- licensing compliance has dropped dramatically.

Pinellas County, Florida

- breeder licensing since 1992
- animal control budget increased 75% with revenue increasing only 13%.
- shelter intake and euthanasia rates increased after the law took effect

San Mateo County, California

The nation's first mandatory spay/neuter law was in San Mateo County, CA. In 1991, dog deaths in the areas governed by the MSN ordinance increased 126% and cats 86%, while areas of the county not covered by MSN laws decreased. Licenses declined by 35%. It was primarily pushed by the Peninsula Humane Society (PHS). The PHS assessed the San Mateo MSN law to have been "disappointing" since it led to increases in shelter killing. As a result, the PHS does not support CA AB 1634. Supporters of AB 1634 do not use San Mateo statistics, as it is so widely recognized as a failure.

Camden County, New Jersey

1996 mandatory spay/neuter ordinance: PAWS NJ comments 5 years later, 'An analysis of these statistics shows the Humane Society of Southern NJ which operates the Camden County Animal Shelter, to be consistently one of the leading, if not the leading killers of animals in the state of New Jersey.'

REGIONAL ANIMAL SHELTERING STATISTICS
CY2008

CY2008 TOTAL* includes dogs/cats/other	Clark County (unincorp)	Las Vegas	NLV	Henderson	Boulder City	Total
IMPOUNDS	19337	20706**	8413	6406	589	55451
Dispositions:						
Adoptions	3845	4462	1742	2303	86	12438
Return to Owner	2029	1948	857	974		5808
Euthanasia	12017	11595	4389	2654	266	30921
Dead on Arrival	667	1824	1004	371	44	3910
Other:						
Died on Premises	95	117	44	27		267
Missing, Escaped	20	25	8	13		66
Relocate				81		81
Transfer to rescue	658	720	315			1693
						55184
Total Dispositions	19331	20691	8359	6423	396	55200

*Individual locality numbers do not equal "Total" numbers.

Population 2008	861,546	599,087	216,672	272,063	16,840	1,986,146
Impounds/1000	22.44	34.56	38.83	23.55	34.98	27.92
Adoptions/1000	4.46	7.45	8.04	8.46	5.11	6.26
Euthanasia/1000	13.95	19.35	20.26	9.76	15.80	15.57
Adoptions as % of Depositions	20%	22%	21%	36%	22%	23%
Euthanasia as % of Depositions	62%	56%	53%	41%	67%	56%

** Las Vegas believes impounds at 18,439.
Data collected from Lied Animal Shelter, Henderson and Boulder City Animal Control agencies and compiled by the Las Vegas Valley Humane Society. Population data from "Clark County Demographics"

Las Vegas Valley Humane Society Sept/2009

8 wks → 3 months - Dallas

DOGS CY2008	Clark County (unincorp)	Las Vegas	NLV	Henderson	Total
Impounds	8331	9921	4740	2990	25982
Dispositions:					
Adoption	2500	3036	1364	1071	7971
Return to Owner	1685	1686	802	853	5026
Euthanasia	3313	3913	1879	921	10026
Dead on Arrival	260	587	384	128	1359
Other:					
Died on Premises	27	32	17	8	86
Missing	8	12	3	7	30
Transfer to Rescue	544	632	276		1452
Relocate to other agency				7	7
Total Dispositions (Outcomes)	8337	9898	4725	2995	25957

CATS CY2008	Clark County	Las Vega	NLV	Henderson	Total
Impounds	10065	9785	3346	3197	26393
Dispositions:					
Adoption	1076	1199	315	1128	3718
Return to Owner	243	239	52	116	650
Euthanasia	8340	7289	2416	1704	19749
Dead on Arrival	300	971	525	223	2019
Other:					
Died on Premises	37	51	4	15	98
Missing	11	10	2	5	28
Relocate to other				16	16
Transfer to Rescue	46	6	2		54
Total Dispositions	10053	9765	3316	3207	26332

Data collected from Lied Animal Shelter, Henderson and Boulder City Animal Control agencies and compiled by the Las Vegas Valley Humane Society