Veldran, Lisa

From: Strasser, John
Sent: Tuesday, December 02, 2014 1:37 PM
To: All Alders; Veldran, Lisa
Subject: FW: Information about Spay/Neuter of Dogs and Cats
Attachments: Determining the optimal age for gonadectomy of dogs and cats - JAVMA 2007.pdf; Banfield - State of Pet Health Report 2013.pdf

Tonight there may be some opposition to the spay neuter ordinance. Here is the data from the largest study ever done and featured in the Journal of the American Veterinarian Association. The data is clear and altered animal is healthier and safer in the community.

The writer of this email regrets that she could not be here tonight.

Lisa, can you make her statements part of the record?

Thanks

John

Sent using OWA for iPad

From: Susan Krebsbach <skrebsbach@hsvma.org>
Sent: Tuesday, December 2, 2014 12:56:08 PM
To: Strasser, John
Cc: Melissa Tedrowe
Subject: Information about Spay/Neuter of Dogs and Cats

Hi John,

As I shared with you on the telephone, I am so sorry that I will not be able to attend the meeting this evening.

Below are some talking points about spay/neuter of dogs and cats that comes from studies that have been done on the topic (remember to ask people to go back to what the data is telling us):

1. From the study "Determining the optimal age of gonadectomy of dogs and cats – JAVMA 2007" (attached):
    a. Note: This study comes from the *Journal of the American Veterinary Medical Association (JAVMA)*—which is THE premier journal in veterinary medicine and one of the most thorough in looking at all of the factors.
    b. Premise of study: Decisions on whether or not to spay/neuter a pet must be based on an assessment of all known relationships between reproductive status and health and longevity, not just one or two.
    c. Summary of the study:
        i. Sterilization *decreases* or eliminates the risk of several conditions that have a very high incidence:
            1. Mammary cancer
                a. Mammary tumors are THE most common type of tumor (and malignant tumor) of female dogs and the third most common tumor of cats (and greater than 90% are malignant).
                b. Ovariohysterectomy (spay) is protective against mammary tumors, especially if done prior to the first estrus (heat) cycle.
            2. Testicular cancer
                a. Testicular tumors are the 2nd most common type tumor of male dogs.
                b. Castration (neuter) is not only curative, it is preventative.
            3. Pyometra (inflammation of the uterus)

a. Incidence report up to 24% in female dogs.
b. Ovariohysterectomy (spay) is not only curative, it is preventative.

4. Benign prostatic hypertrophy-hyperplasia
   a. 50% incidence in intact male dogs by 2.4 years of age, 80% by 6 years of age, and 95 – 100% by 9 years of age.
   b. Castration (neuter) is not only curative, it is preventative.

ii. Sterilization *increases* the risk of several conditions that have a very low incidence:
1. Prostatic cancer
2. Transitional cell carcinoma
3. Osteosarcoma
4. Diabetes mellitus
5. Hypothyroidism

2. From the study "Banfield – State of the Pet Health Report 2013 (attached):
   a. Note: This is one of the most comprehensive studies done, including 2.2 million dogs and 460,000 cats.
   b. Conclusions on longevity:
      i. Spayed female dogs live an average of 11.6 years—23% longer than unspayed dogs.
      ii. Neutered male dogs live an average of 11.1 years—18% longer than unneutered dogs.
      iii. Spayed female cats live an average of 13.1 years—39% longer than unspayed dogs.
      iv. Neutered male cats live an average of 11.8 years—62% longer than unneutered dogs.
   c. Additional data of interest:
      i. Intact dogs are more than twice as likely to be hit by a car as neutered dogs.
      ii. Intact dogs are more than twice as likely to bitten by another animal as neutered dogs.
      iii. Intact cats are 4 times as likely to be hit by a car as neutered cats.
      iv. Intact cats are 3 times as likely to be brought to a veterinarian for treatment of animal bites as neutered cats.

I hope this is helpful. Good luck tonight!

Warm Regards,

Susan

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Reference Point

Determining the optimal age for gonadectomy of dogs and cats

Margaret V. Root Kustritz, DVM, PhD, DACT

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%.[64] 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 downregulation 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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BANFIELD PET HOSPITAL®

State of Pet Health 2013 Report

Due to the fact that dogs and cats age much faster than humans—one year for a human is roughly five to seven years for a dog or cat—it is especially important that pet owners understand the potential factors that may impact how long their pet lives. The lifespan of a dog or cat can be impacted by various factors including genetics, whether or not a dog or cat is spayed or neutered, the amount of preventive veterinary care received and, of course, breed type and size. The geographic location where a pet lives may also impact his or her lifespan due to preventable diseases plaguing certain parts of the United States. Preventable diseases such as heartworm disease and Lyme disease are life-threatening and may play a role in a reduced lifespan in certain areas of the country such as the Northeast (Lyme disease) and the Southeast (heartworm disease). Heartworm infection is one of the top three conditions or diagnoses for pets seen in Banfield hospitals in the Southern states including Louisiana, Mississippi and Alabama, among others. These three Southern states had the shortest lifespan for dogs in 2012—Louisiana and Mississippi were also the bottom two states for lifespan in cats.

Lifespan estimates are based on age at euthanasia for Banfield patients > 1 year of age.

breed chart

Dogs and cats can be prone to certain diseases based on their breed. For dogs, breed size can also put them at an increased risk for certain diseases and have a significant impact on their overall lifespan. The bottom-line is that size does matter! Toy/small breed dogs, such as a Chihuahua and Shih Tzu, live 41 percent longer than giant breed dogs, such as a Great Dane or St. Bernard. As a result of their shorter lifespan, giant breed dogs can be expected to reach their senior years much earlier than small breed dogs do (*i.e.*, at 6 years of age rather than 10 years of age), which means they are likely to develop aging-associated diseases such as arthritis or kidney disease earlier than small breeds as well. As such, breed and breed size are important in understanding the diseases or conditions to which a dog may be predisposed.

Banfield sees 1 cat per 5 dogs

cat

average weight: 10 lbs
average lifespan: 12.1 yrs

COMMON BREEDS:
Domestic Shorthair
Domestic Medium Hair
Domestic Longhair

COMMON NAMES:
Kitty
Bella
Tiger
Max

COMMON DIAGNOSES:
Feline respiratory virus
Kidney disease
Tapeworms

51% of dogs seen at Banfield

toy/small

weight: <20 lbs
average lifespan: 11.3 yrs

COMMON BREEDS:
Chihuahua
Scottish Terrier
Shih Tzu
Yorkshire Terrier

COMMON NAMES:
Bella
Max
Buddy
Daisy

COMMON DIAGNOSES:
Dental tartar
Patellar luxation (kneecap pops out of place)
Retained baby teeth

27% of dogs seen at Banfield

medium

weight: 20-50 lbs
average lifespan: 10.8 yrs

COMMON BREEDS:
Beagle
Boxer
Cocker Spaniel
Pit Bull

COMMON NAMES:
Bella
Max
Buddy
Daisy

COMMON DIAGNOSES:
Conjunctivitis (eye infection)
Dermatitis (skin inflammation)
Fleas

21% of dogs seen at Banfield

large

weight: 50-90 lbs
average lifespan: 11.1 yrs

COMMON BREEDS:
German Shepherd
Golden Retriever
Labrador Retriever
Rottweiler

COMMON NAMES:
Bella
Max
Buddy
Sadie

COMMON DIAGNOSES:
Dental tartar
Otitis externa (ear infection)
Overweight

2% of dogs seen at Banfield

giant

weight: >90 lbs
average lifespan: 8 yrs

COMMON BREEDS:
Great Dane
Great Pyrenees
Mastiff
St. Bernard

COMMON NAMES:
Bella
Bear
Max
Roxy

COMMON DIAGNOSES:
Dermatitis (skin inflammation)
Lameness
Skin tumor

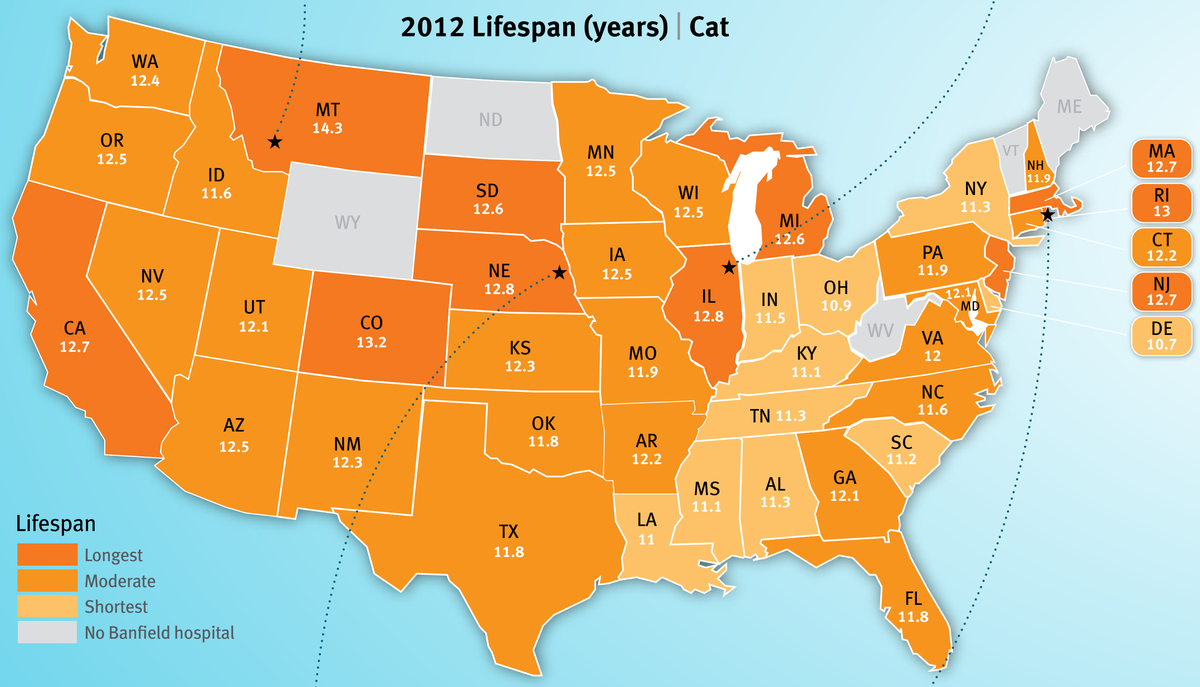
Spot, 20, Bozeman, Montana
Spot is patient, loving and a little bit predatory. He stays fit by stalking the occasional bird but only dreams of actually catching one. As a kitten he tolerated being dressed up like a doll, but preferred to remain a cat. He currently spends his days playing with a piece of yarn, dining on food specially made for seniors and sunbathing on the porch.
Banfield Optimum Wellness Plan client since 2007

Muffins, 22, Chicago, Illinois
Muffins was named after eating a whole bag of baked goods. Born the runt of the litter, he quickly grew into his big, bullish personality. Quick to adapt to any situation, Muffins is currently living in his seventh home with his one loving owner. At 22 years of age, Muffins has outlived three other pets and several foster cats.
Banfield client since 2004

Ginger, 19, Miniature Pincher, Medford, Oregon
A little grumpy in her younger years, Ginger has become quite the loving and loyal companion. Possibly the only dog to prefer cats over humans, Ginger spent many hours cuddling her favorite feline companion, Tiger. Today, Ginger is known as her owner's shadow and rarely leaves her owner's side (unless it's for a bite of spaghetti).
Banfield Optimum Wellness Plan client since 2003

Julius Caesar, 18, Yorkshire Terrier, Rapid City, South Dakota
Julius Caesar loves sitting on laps, sniffing the yard and wrestling. He successfully trained two humans to wait on him and has an actual seat at the dinner table. He also has been known to enjoy a motorcycle ride and regularly snacks on baby carrots.
Banfield client since 2008

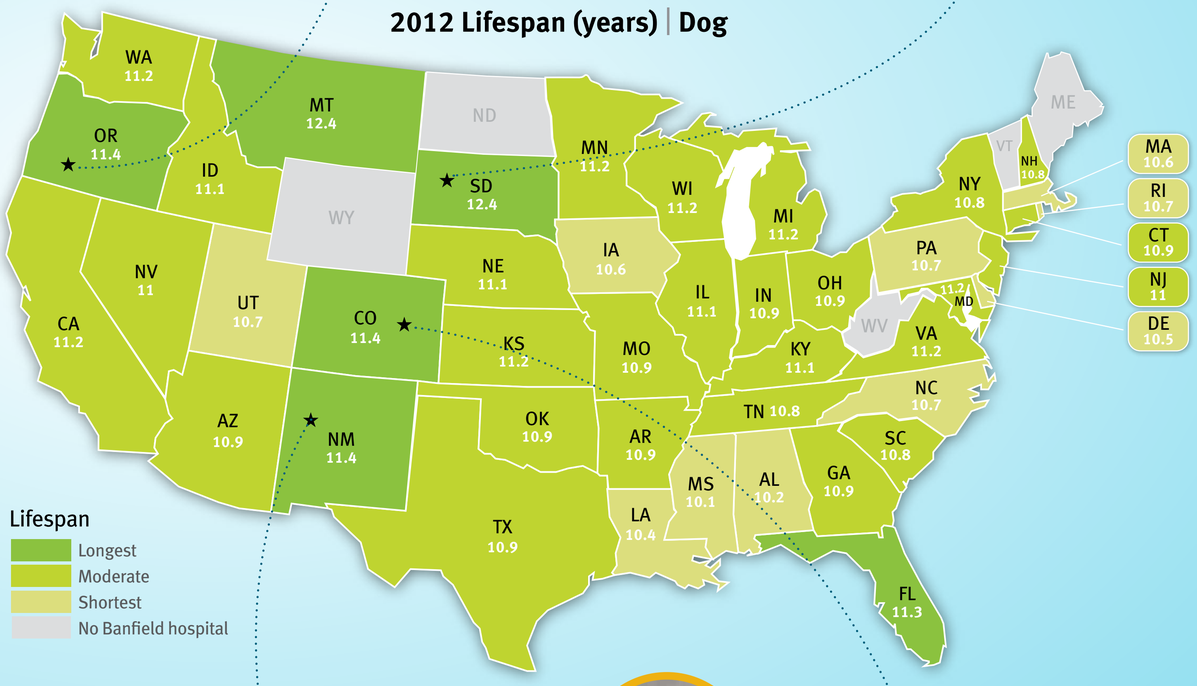
2012 Lifespan (years) | Cat

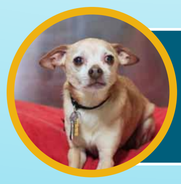


Zoe, 18, Omaha, Nebraska
Zoe has particular tastes and a subjective personality with humans and with food. She shows love by "head butting" in exchange for quality belly rubs. She is particularly fond of being warm and is most often found sleeping by the vent or snuggling with her owners.
Banfield Optimum Wellness Plan client since 2009

Nemesis, 21, Johnston, Rhode Island
Quite the practical joker, Nemesis loves to climb to high places and jump in front of unsuspecting people. He enjoys walking on a leash and is known for ruling the house with an iron paw. He's also been known to chew on rawhide and snack on the occasional Scrabble dictionary (that's actually how he got his name!).
Banfield client since 2011

2012 Lifespan (years) | Dog



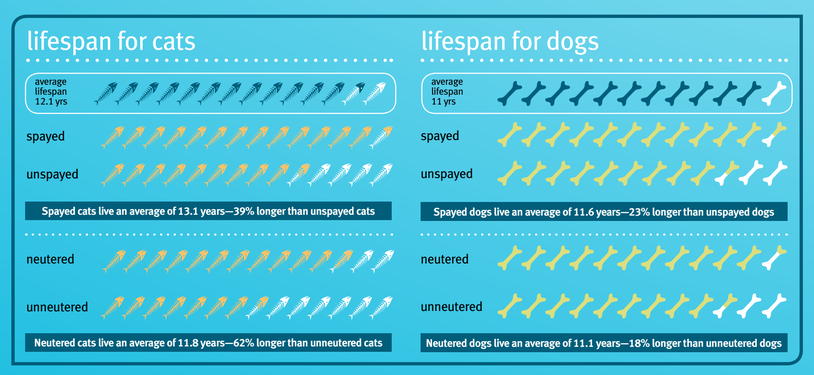


Poncho, 18, Chihuahua, Albuquerque, New Mexico
Extremely energetic and a happy boy, Poncho loves playing tag with his owner's 3-year-old granddaughter and following his owner everywhere. After long days of rolling in the grass and lying in the sun, Poncho refuels his energy by snacking on carrots and apples.
Banfield Optimum Wellness Plan client since 2011

Daisy and Cupid, 17, Shih Tzus, Aurora, Colorado
Daisy is an extremely loving, gentle and friendly dog. She makes friends with everyone she meets, including a few feathered friends from the neighborhood! Her best friend is her sidekick, Cupid, who is known affectionately as the "ball-of-fluff!" Daisy shows off her boundless energy by running in circles and nibbling on her owner.
Banfield Optimum Wellness Plan clients since 2008

spay & neuter

While it is not possible to predict the lifespan of a pet, there are many preventable diseases and conditions that impact a pet's overall health and well-being, which may influence life expectancy. Some of the most significant findings in this year's report include the impact spaying or neutering has on a pet's lifespan.



Spaying or neutering provides several advantages that likely contribute to a longer lifespan. Neutering male pets decreases their chances of developing prostatic enlargement and disease and eliminates the risk of testicular cancer. Spaying female pets eliminates the risk of pyometra, a life-threatening infection of the uterus. If a female is spayed before her first heat cycle, chances of developing breast cancer drop dramatically as well. Behavior problems are the primary reason pet owners relinquish their pets to shelters, and pets that haven't been spayed or neutered are more likely to exhibit undesirable behaviors such as roaming, urine marking or fighting.

Banfield patient data also show that unneutered dogs are more than twice as likely to be hit by a car or bitten by another animal as neutered dogs. The situation is even worse for cats—unneutered cats have 4 times the risk of being hit by a car as neutered cats. Unneutered cats are also 3 times as likely as neutered cats to be brought to the veterinarian for treatment of an animal bite.

states with the shortest lifespan

(of the 43 states in which Banfield has a hospital)

mississippi

rank: 43
lifespan: 10.1 yrs

- Spayed/Neutered: 56%
- High prevalence for: heartworm infection, hypothyroid disease
- Low prevalence for: arthritis, diabetes mellitus
- Most common breeds: Labrador Retriever, Chihuahua & Shih Tzu

alabama

rank: 42
lifespan: 10.2 yrs

- Spayed/Neutered: 68%
- High prevalence for: heart disease, fleas
- Low prevalence for: diabetes mellitus
- Most common breeds: Labrador Retriever, Shih Tzu & Chihuahua

louisiana

rank: 41
lifespan: 10.4 yrs

- Spayed/Neutered: 62%
- High prevalence for: fleas, heartworm infection
- Low prevalence for: arthritis, dental disease
- Most common breeds: Labrador Retriever, Shih Tzu & Chihuahua

delaware

rank: 40
lifespan: 10.5 yrs

- Spayed/Neutered: 71%
- High prevalence for: internal parasites
- Low prevalence for: arthritis, heart disease
- Most common breeds: Labrador Retriever, Yorkshire Terrier & Pit Bull

massachusetts

rank: 39
lifespan: 10.6 yrs

- Spayed/Neutered: 77%
- High prevalence for: arthritis, overweight & obesity
- Low prevalence for: roundworm
- Most common breeds: Labrador Retriever, Chihuahua & Yorkshire Terrier

States with the shortest lifespan for both dogs & cats

delaware

rank: 43
lifespan: 10.7 yrs

- Spayed/Neutered: 88%
- High prevalence for: hyperthyroid disease, internal parasites
- Low prevalence for: arthritis, heart disease

ohio

rank: 42
lifespan: 10.9 yrs

- Spayed/Neutered: 85%
- High prevalence for: heart disease, otitis externa
- Low prevalence for: kidney disease, thyroid disease

louisiana

rank: 41
lifespan: 11 yrs

- Spayed/Neutered: 80%
- High prevalence for: internal parasites
- Low prevalence for: kidney disease, overweight & obesity

kentucky

rank: 40
lifespan: 11.1 yrs

- Spayed/Neutered: 89%
- High prevalence for: diabetes mellitus, otitis externa
- Low prevalence for: heart disease, kidney disease

mississippi

rank: 39
lifespan: 11.1 yrs

- Spayed/Neutered: 81%
- High prevalence for: heart disease, otitis externa
- Low prevalence for: thyroid disease, diabetes mellitus

looking ahead

Banfield Pet Hospital is committed to improving the health and well-being of pets everywhere, and we are equally dedicated to uncovering the factors that threaten their lifespan.

The *State of Pet Health 2013 Report* features an exclusive look at the lifespan of both dogs and cats and provides additional insight into the overall health of our pet population. Although considerable differences in lifespan were highlighted in comparisons of pets by year, sex, reproductive status, breed size and state of residence, the factors underlying these differences remain to be identified.

In our ongoing commitment to improving the health and well-being of pets, the BARK team is following up on this report's findings by thoroughly investigating factors that might influence lifespan in dogs and cats—factors such as body condition that, when effectively managed, may help keep pets with their owners longer. We look forward to sharing the results of these studies with pet owners and the veterinary community in early 2014.

State of Pet Health Report
Banfield PET HOSPITAL

For a state-by-state interactive look at pet health, visit StateofPetHealth.com and follow us on

BANFIELD PET HOSPITAL®

State of Pet Health 2013 Report

Welcome to Banfield Pet Hospital's *State of Pet Health 2013 Report*—the only report of its kind to capture and analyze the medical data from nearly 2.2 million dogs and 460,000 cats. As the largest veterinary practice in the world, Banfield operates more than 800 hospitals in 43 states, and more than 13,000 associates—including 2,600 licensed veterinarians—work at Banfield. As such, Banfield has a unique understanding of the health of companion animals. Through our extensive commitment to innovation, our practice has created this ground-breaking report, now in its third year.

about banfield

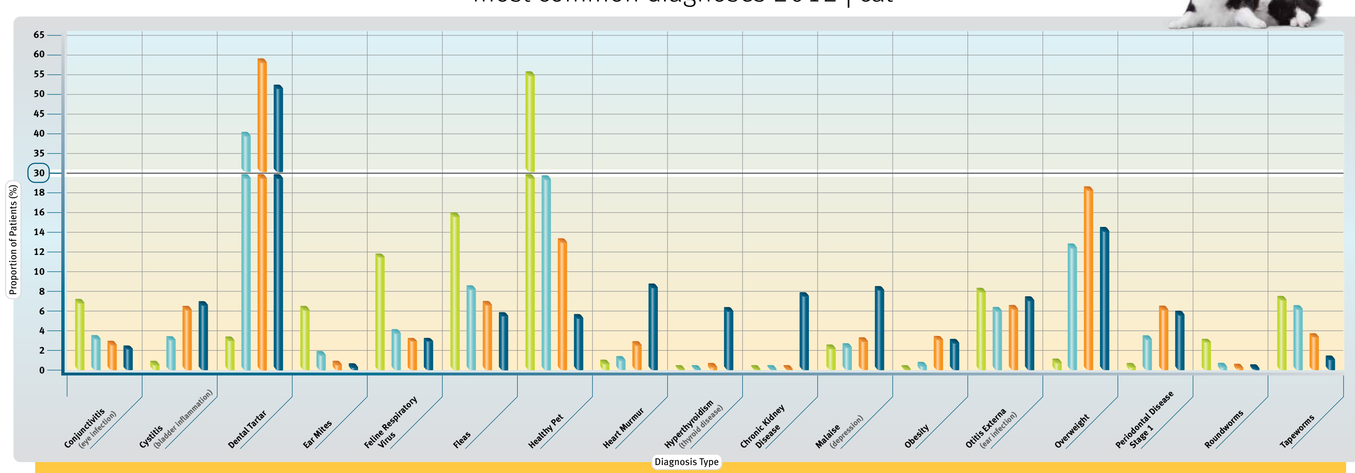
As a practice, our focus is making a better world for pets by delivering high-quality veterinary medicine and providing preventive care. We are the leader in innovative pet healthcare programs, such as Optimum Wellness Plans®—packages of preventive care services at an affordable price. Banfield believes preventive care improves the quality and longevity of a pet's life by reducing the risk of developing serious, costly and sometimes fatal diseases—many of which are preventable or, without treatment, can become chronic. This is why Banfield emphasizes the importance of twice-annual comprehensive examinations and a partnership between pet owners and their veterinarian to identify changes in a pet's overall health and well-being. We believe that regular preventive care and early disease diagnosis will positively impact a pet's health and lifespan.

Banfield's veterinarians and paraprofessionals use PetWare®, Banfield's proprietary data/electronic medical records system, to collect data from every pet cared for in Banfield hospitals. Information is downloaded daily to the medical database at Banfield's main campus in Portland, Ore. Data are then analyzed by Banfield's internal research team, Banfield Applied Research & Knowledge (BARK).

Banfield's commitment to providing high-quality veterinary care is grounded in evidence-based medicine—this is supported by BARK's team of researchers, many of whom are veterinarians and are dedicated to population-based research. The BARK team analyzes the medical data of more than 7 million pet visits at Banfield hospitals each year to develop insights into diseases affecting pets. Findings of the studies they conduct are shared with veterinarians and the public through various avenues including continuing education materials, scientific journals, the *Banfield Journal* (a medical publication), and the annual *State of Pet Health Report*.

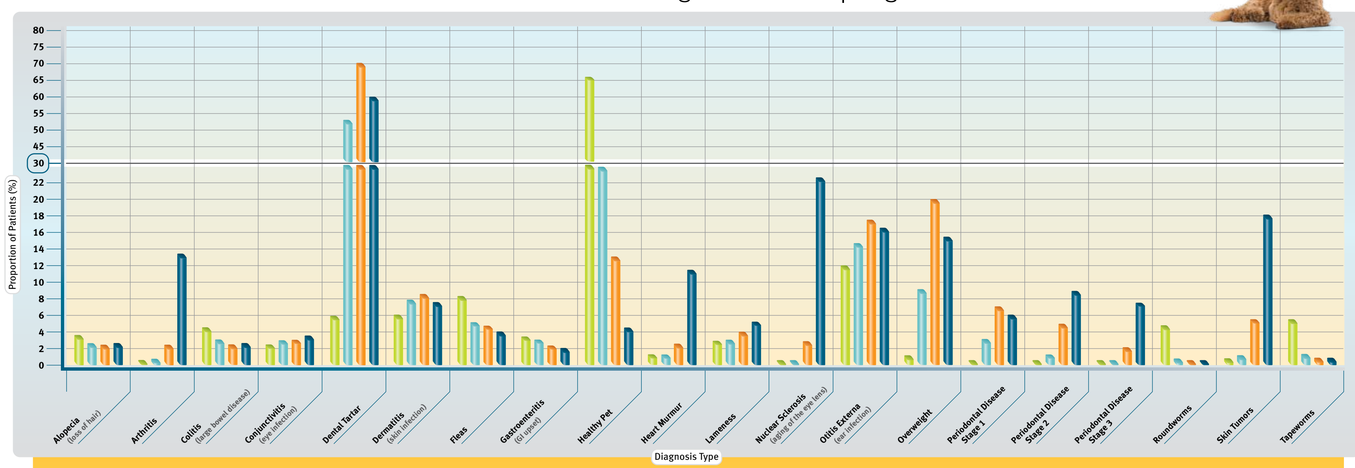
Our commitment also extends to forming partnerships that will benefit pets and pet owners. This philosophy led PetSmart®, the nation's largest retailer of pet-related products and services, to ask Banfield to bring high-quality care to their stores in 1994. In 2007, Banfield joined the Mars Incorporated family of businesses with the common goal of providing high-quality pet care and nutrition to companion animals.

most common diagnoses 2012 | cat



These diagnoses are a compilation of the most common diagnoses found in cats throughout the year. While "Healthy Pet" is not a true medical diagnosis, it is important to include, as it reinforces that pet owners should bring their pets to the veterinarian for preventive care, as well as when their pets are sick or injured. Reasons for a "Healthy Pet" visit include physical examinations, routine vaccinations and blood work or nutritional counseling, among others.

most common diagnoses 2012 | dog



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2012 at a glance

The **average lifespan** of a cat in 2012 was 12 years—up 1 year since 2002.

10% increase

20% (or 1 in 5) of the cats in **Louisiana** and **Mississippi** are not spayed or neutered, and these are among the states with the shortest lifespans for cats. But in **Montana** and **Colorado**, the states with the longest lifespans, that number is closer to **8%** (or 1 in 12).

Montana and Oregon are tied for the highest percentage of geriatric cats at 24%

Neutered male cats live longer than unneutered males. **62%** longer

Spayed female cats live longer than unspayed females. **39%** longer

2 of the **5** states with the shortest lifespan for dogs have the highest number of unneutered and unspayed dogs

UNNEUTERED & UNSPAYED
Mississippi 44%
Louisiana 38%

These two states were also among the states for highest prevalence of **heartworm infection** in 2012. **top 5**

The **average lifespan** of a dog in 2012 was 11 years—up nearly half a year since 2002.

4% increase

41% longer

Size does matter! Toy/small breed dogs live longer than giant breeds.

Neutered male dogs live longer than unneutered males. **18%** longer

Spayed female dogs live longer than unspayed females. **23%** longer

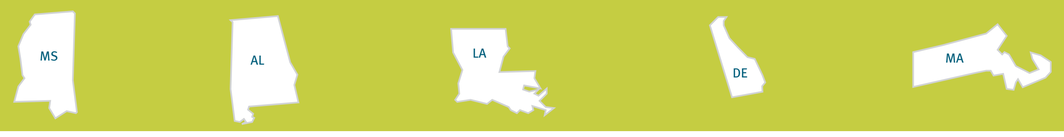
Oregon has the highest percentage of geriatric dogs at 13%

STATES WITH THE LONGEST LIFESPAN FOR CATS

STATES WITH THE LONGEST LIFESPAN FOR DOGS

STATES WITH THE SHORTEST LIFESPAN FOR CATS

STATES WITH THE SHORTEST LIFESPAN FOR DOGS



common diseases

overweight & obesity

Prevalence of excess body weight increased over 5 years: **37%** in dogs, **90%** in cats

Overweight and obesity have reached epidemic levels in dogs and cats in the United States, affecting approximately 1 in 5 dogs and cats. Although some might consider pets to be cuter or happier when they are overweight, the truth is, being overweight is linked to other serious conditions such as arthritis, heart and respiratory problems and diabetes mellitus (cats).

arthritis

Prevalence of arthritis has increased over 5 years: **38%** in dogs, **67%** in cats

Arthritis, or inflammation of the joints, affects dogs and cats just as it does humans. If left untreated, the disease can cause irreversible joint damage, resulting in pain and restricting a pet's ability to move or sit comfortably. Because pets, particularly cats, are good at hiding signs of discomfort, and because the signs of arthritis can be hard to distinguish from those of other diseases, arthritis is likely more common than currently reported.

kidney disease

Kidney disease is almost **7x** more common in cats than in dogs

The most common kidney problem seen in pets is chronic kidney disease. While the disease is more common in cats, it affects dogs as well. Adult, and particularly geriatric pets, are more at risk than younger pets. When kidneys become diseased, critical processes become impaired and affect the body in many ways.

diabetes mellitus

Prevalence of diabetes mellitus in dogs **has doubled in the past 5 years**

Diabetes mellitus is a serious medical condition in which a pet cannot control blood sugar levels due to problems with insulin production or function. Pet owners' most common concerns are when pets display polyuria (excessive urination), polydipsia (excessive thirst) and weight loss, despite a good appetite. Diabetes mellitus is a chronic disease, requiring lifelong treatment and monitoring.

heartworm disease

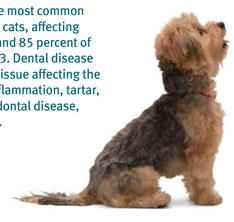
Pets are diagnosed with heartworm disease **every month of the year**

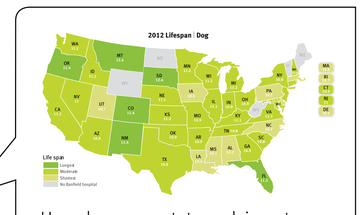
Heartworm disease is a serious but preventable condition caused by *Dirofilaria immitis*—long, slender parasitic worms that can reach up to 12 inches in length. Heartworm disease affects dogs, cats and ferrets and is potentially fatal. *Dirofilaria immitis* is transmitted from one pet to another by mosquitoes. Both indoor and outdoor pets are at risk for heartworm disease.

dental disease

Dental disease affects **91%** of all dogs over the age of 3

Dental disease is the most common disease in dogs and cats, affecting 91 percent of dogs and 85 percent of cats over the age of 3. Dental disease includes any health issue affecting the mouth, including inflammation, tartar, gingivitis and periodontal disease, among other issues.





How does your state rank in pet health? Learn more about the common and chronic diseases and conditions affecting pets in the U.S. as well as how each state ranks at **StateofPetHealth.com**