



Age of Neutering in Cats & Dogs: When Is Best?

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A research report conducted with the audience of

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Neutering is a common procedure performed in daily practice for population control, with additional possible beneficial effects on behavior, health, and longevity. The question of whether to neuter—as well as the optimal time to neuter—is controversial, as some of the purported benefits of neutering have been challenged and the health risks better defined through reports of increased risk for urinary incontinence,¹⁻³ cystitis,⁴ aggression,⁵ obesity,^{6,7} cancer,^{8,9} and cranial cruciate ligament disease.^{10,11} Pet owners often seek their veterinarian's advice regarding whether to neuter their pet and when. Many also seek opinions from their breeder, friends, and family and have performed independent research online; however, clinicians are best placed to help owners evaluate the evidence and make an informed choice.

A *Brief Insights* survey was sent to small animal veterinarians to determine the recommendations commonly made for neutering in cats and dogs. Of the 698 respondents, the majority (98%) routinely recommend neutering in pet dogs and cats.

Timing of Neutering

Early neutering is often considered primarily to ensure population control. In shelter populations, neutering may be considered in pediatric animals prior to rehoming and is thought to improve adoption and retention rates in homes.¹² Studies evaluating the effects of neutering before 24 weeks of age have not shown differences in long-term behavioral or medical outcomes.^{13,14} In addition, neutering around first estrus has been recommended to help prevent mammary cancer in bitches.¹⁵ In a recent systematic review, the evidence that neutering reduces the risk for mammary neoplasia and that age of neutering has an influence was determined to be weak, and it was suggested that this evidence should not be used for recommendations due to potential bias of available studies.¹⁶ Other publications have suggested an association between neutering and increased risk for some cancers, some of which are rare (eg, cardiac cancer) or only assessed in specific breeds.⁹ More recently, early neutering has been associated with cranial cruciate ligament rupture and other joint disorders in large-breed dogs.^{10,11,17} Veterinarians must consider this information

The majority of surveyed veterinarians reported a change in recommendations for neutering of large and giant-sized dogs.

when making recommendations to help pet owners assess the risks and benefits of neutering their pet.

Changing Pet Owner Preferences & Veterinarian Recommendations

The majority (71%) of surveyed veterinarians reported a change in recommendations for neutering of large and giant-sized dogs within the last 5 years, and 21% reported a change in recommendations for neutering of small- and medium-sized dogs. Only 5% reported a change in neutering recommendations for cats. This may be due to the recent publications on associations between specific large-breed dogs and development of orthopedic disease and cancer.^{9,11,17} The most commonly reported sources of information used to guide veterinarians' recommendations on the timing of neutering included published studies (80%), journal articles (77%), lectures by specialists (58%), and discussion with peers (60%).

Pet owners have access to information from a wide range of sources (eg, social media, open-access veterinary journals) to research questions about neutering. Despite this availability of information, however, only 43% of surveyed veterinarians have observed changes in pet owner attitudes regarding neutering.

Conclusion

Counseling pet owners regarding whether and when to neuter should include discussion of the benefits and risks of neutering. Recommendations regarding the timing of neutering may be different for dogs and cats depending on the owner's goals, the breed (dogs), and disease susceptibilities. Early neutering may be indicated in some cases, but the timing should not center around the first or second estrus in bitches specifically for prevention of mammary tumor development, given the weaknesses and bias of the studies.¹⁶

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METHODOLOGY

- ▶ An email invitation with a link to a 10-minute online survey was sent from *Clinician's Brief* to veterinarians.
- ▶ A total of 698 surveys were completed by veterinarians and are included in the analysis.
- ▶ The margin of error for a sample size of 698 is +/-3.7% at the 95% confidence interval.
- ▶ The survey was fielded from March 1 to March 6, 2019.

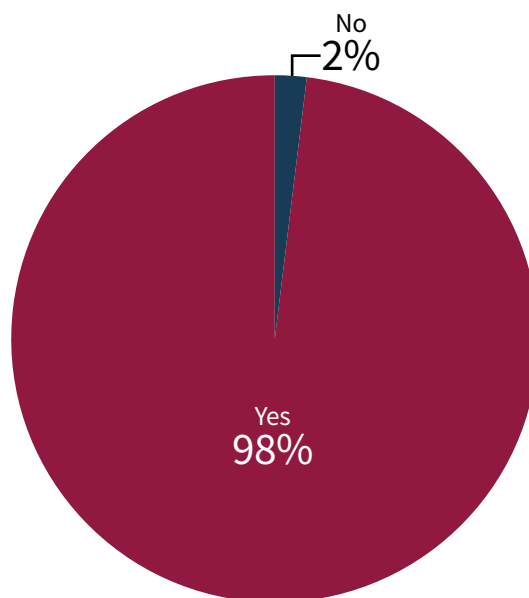
RESPONDENT PROFILE

- ▶ The majority (93%) of respondents are in exclusive small animal practice, with 87% in general practice. Eighty percent are in a private practice, whereas 20% are in a corporate practice. More than half (56%) are associates, and 37% are owners/partners.
- ▶ Most (71%) respondents are female.
- ▶ Generation X* (37%) makes up the largest group of respondents, followed closely by Baby Boomers (32%) and Millennials (28%).
- ▶ The largest number (36%) of respondents are from the southern region of the United States.

*For the purposes of this survey, generations are defined as follows: Millennial = born 1982 or later; Generation X = born 1965-1981; Baby Boomer = born 1946-1964; Greatest Generation = born 1945 or earlier

SURVEY RESULTS

Do you routinely recommend neutering pet dogs and cats?



In general, when do you currently recommend castrating dogs and cats?

	Small & Medium-Sized Dogs	Large & Giant-Sized Dogs	Cats
At age 0-2 months	0%	0%	1%
At age 3-4 months	6%	3%	16%
At age 5-6 months	55%	15%	69%
At age 7-9 months	22%	10%	10%
At age 10-12 months	5%	21%	1%
At age 13-18 months	2%	24%	0%
At age 19+ months	0%	5%	0%
At skeletal maturity	4%	16%	0%
Other	4%	6%	2%
I don't recommend castrating	1%	1%	0%

Timing for Castration: Segmentations*

	Millennial	Gen X	Baby Boomer
Small & Medium-Sized Dogs			
At age 5-6 months	65%	51%	51%
Large & Giant-Sized Dogs			
At age 10-12 months	28%	18%	18%

*This table shows responses that varied significantly among age groups to the question *In general, when do you currently recommend castrating dogs and cats?*

For small or medium-sized dogs, the majority of respondents recommended neutering at specific ages versus in relation to estrous cycles or skeletal maturity. Veterinarians commonly recommended neutering (male and female) earlier than 9 months of age, most commonly at 5 to 6 months of age. In contrast, for large or giant-sized dogs, neutering male dogs was recommended more commonly at older ages (10-12 months or 13-18 months) or at skeletal maturity.

In general, when do you currently recommend spaying dogs and cats?

	Small & Medium-Sized Dogs	Large & Giant-Sized Dogs	Cats
At age 0-2 months	0%	0%	1%
At age 3-4 months	6%	4%	15%
At age 5-6 months	56%	26%	71%
At age 7-9 months	18%	17%	6%
At age 10-12 months	3%	13%	1%
At age 13-18 months	1%	12%	0%
At age 19+ months	0%	3%	0%
Prior to first estrous cycle	8%	7%	3%
After first estrous cycle	2%	5%	0%
After several estrous cycles	0%	0%	0%
At skeletal maturity	2%	7%	0%
Other	3%	5%	2%
I don't recommend spaying	0%	0%	0%

Timing for Spaying: Segmentations*

	Millennial	Gen X	Baby Boomer
Small & Medium-Sized Dogs			
At age 5-6 months	64%	51%	54%
At age 7-9 months	10%	21%	22%
Prior to first estrous cycle	13%	9%	4%
Cats			
Prior to first estrous cycle	9%	2%	0%

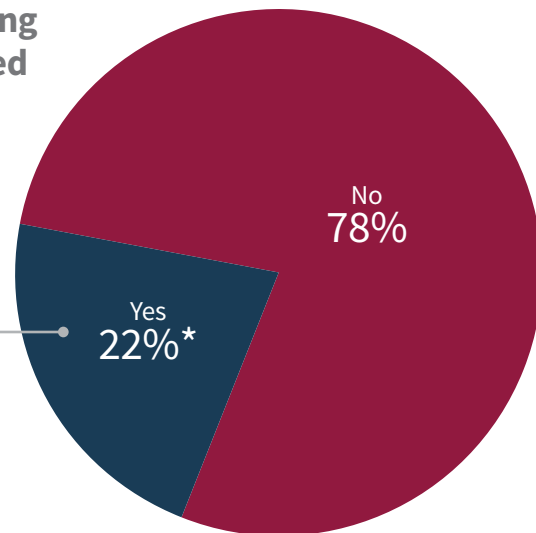
*This table shows responses that varied significantly among age groups to the question *In general, when do you currently recommend spaying dogs and cats?*

In female large or giant-sized dogs, spaying was recommended earlier (5-6 months or 7-9 months) than castration in similarly sized male dogs, and fewer respondents recommended timing spay in relation to estrus or skeletal maturity than did timing castration relative to skeletal maturity. This difference in recommendations for large or giant-sized dogs may reflect the fact that pet owners may be unwilling to have large and giant-sized female dogs go into estrus prior to spay due to inconvenience or concern for inadvertent breeding. Although there may be an increased incidence of joint disorders cited, practicality may override this observation for pet owners and veterinarians.^{11,17}

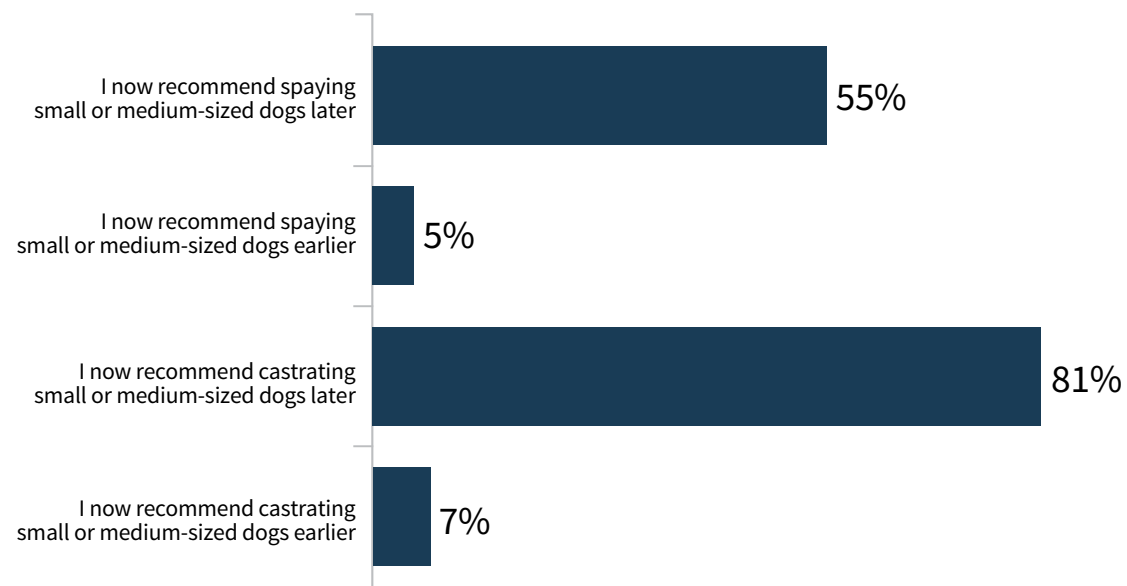
Have your recommendations regarding when to neuter small or medium-sized dogs changed in the past 5 years?

Millennial	11%
Gen X	24%
Baby Boomer	30%

*Significant differences among age groups were present and are outlined above. The number presented in the chart is an average.



How have your recommendations regarding when to neuter small or medium-sized dogs changed?



Base = 154 (those who have changed their recommendations)

WHY HAVE YOUR RECOMMENDATIONS REGARDING WHEN TO NEUTER SMALL OR MEDIUM-SIZED DOGS CHANGED?*

The studies on larger breeds have shown that spaying and neutering at a later age may be more beneficial for the pets, so I have also changed my recommendations for smaller breeds and allow them to grow a bit more before spay/neuter.

Due to reports of hormonal influence on growth plate closure/cruciate tears/breed tendency. Not as much a factor in small/medium-sized dogs, although a border collie, and other active medium sized dogs, are included as a large breed due to their intense stress on joints.

I tell people about the pros and cons of leaving them intact through a first estrous cycle and give the clients the choice. If asked what I would do with my own dog, I tell them I would spay before the first heat cycle due to the benefit of reducing the chances of future mammary cancer.

Concern of increased risk for orthopedic disease, but still worry that waiting too long puts females at risk for mammary cancer

Based on longevity and cancer research, intact animals have less cancer and live longer. If the family is responsible and can manage an intact animal, I recommend leaving the pet intact.

Studies pointing to advantages of allowing natural hormone influence on skeletal maturation. Balanced with behavioral issues and ease or difficulty of owner managing an older intact pet.

Concerns about long-term health effects of desexing prior to full development

Hormonal influences on growth plate closure. I will still do at 6 months, but we used to recommend between 4-6 months.

I have seen too many 6-12-month-old dogs need additional dental work after an earlier spay.

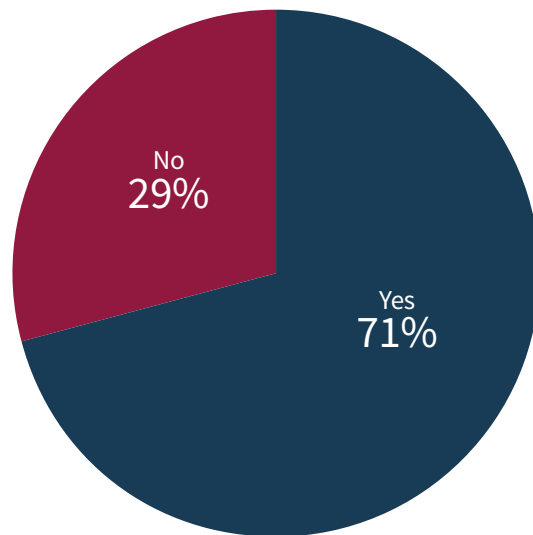
In all dogs, if there is a recessed vulva, I wait until after the first heat to spay if the client will agree to it.

More hormonal influence; better conformation; less cruciate tears; less cancer; less incontinence

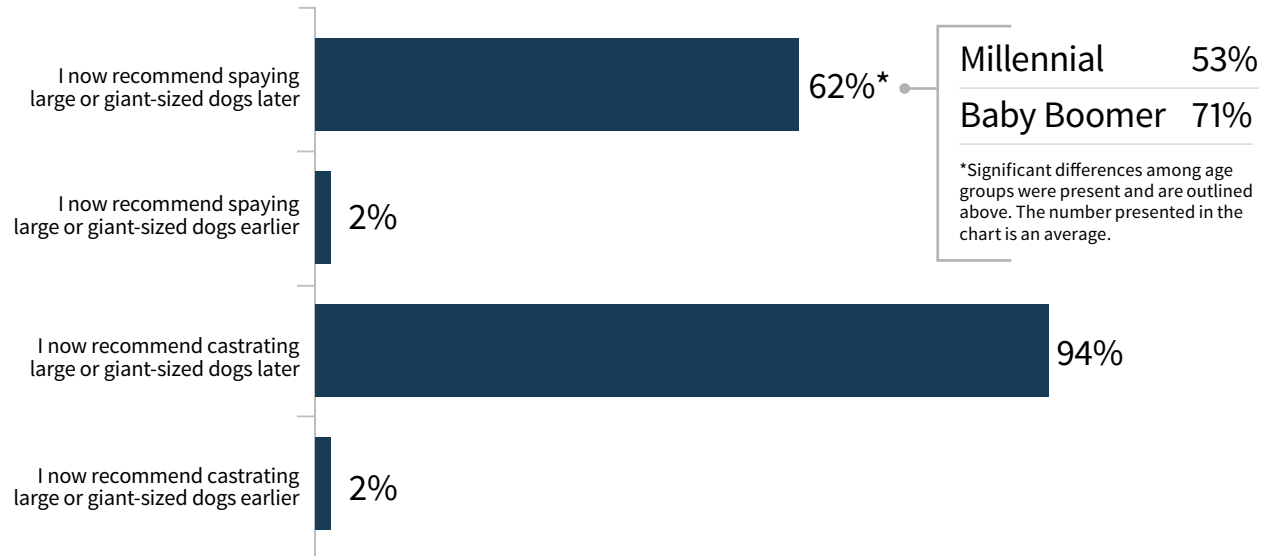
My own observations and articles and studies I have read concerning this issue

*These statements are direct responses from survey respondents. Some responses have been edited slightly for clarity.

Have your recommendations regarding when to neuter large or giant-sized dogs changed in the past 5 years?



How have your recommendations regarding when to neuter large or giant-sized dogs changed?



Base = 494 (those who have changed their recommendations)

WHY HAVE YOUR RECOMMENDATIONS REGARDING WHEN TO NEUTER SMALL OR MEDIUM-SIZED DOGS CHANGED?*

New research studies show there may be a benefit to delayed neutering. Risk is low for issues by waiting in males, so benefit may outweigh the risk.

Better skeletal development and extrapolation from the golden retriever study until we know about other breeds

With spays there's still mammary cancer concerns and increased surgical difficulty, so I'd still recommend 5 to 6 months.

Documented negative effects of early spay/neuter and minimal evidence of negative effects of waiting longer

Faster healing, faster surgery time, prevention of behavior problems with puberty, less mess for owners with heat cycles, and less risk of unintended pregnancies

Studies are indicating that waiting until the growth plates are closed or almost closed might be in the pet's best interest.

In females, mammary neoplasia is still more of a concern than orthopedic disease; spay early regardless of size.

Skeletal maturity, prolonged growth plate openings, potentially decreased female urinary incontinence

Several papers tying both orthopedic issues & urinary incontinence with neutering early

Behavioral, longevity, orthopedic, and neoplasia predispositions

I still recommend spay before the first heat cycle.

Owner concern/breeders instilling fear. Also the small amount of empirical data that we have

Now recommend between 6 to 8 months. Our county law used to be 6 months, but they have made an 8-month spay/neuter requirement now.

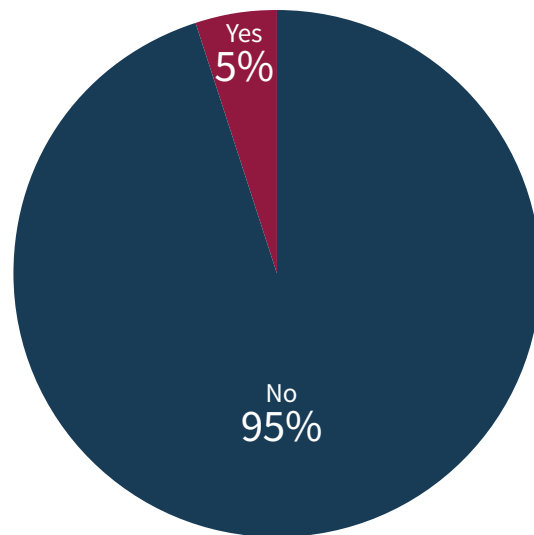
Based on the study out of UC Davis, I often tell owners that we can wait to neuter until a bit older unless there are behavioral reasons.

Due to studies showing that leaving them intact can prevent future arthritis and potentially cancers. Also due to the observation that their body condition is better when left intact until skeletal maturity. Exceptions for recommending earlier castration are environmental and behavioral conditions.

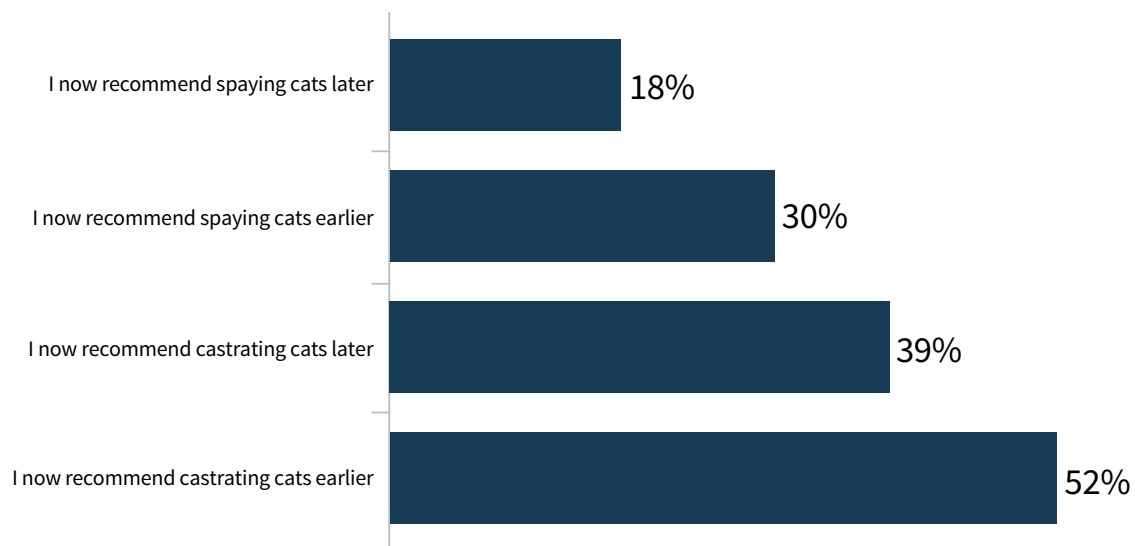
I have maintained that females should still be spayed prior to heat to prevent mammary cancer, and it allows for easier surgery/recovering. Although the new evidence applies to females as well, I think the evidence behind reducing the risk of mammary cancer is more conclusive at this point.

*These statements are direct responses from survey respondents. Some responses have been edited slightly for clarity.

Have your recommendations regarding when to neuter cats changed in the past 5 years?



How have your recommendations regarding when to neuter cats changed?



Base = 33 (those who have changed their recommendations)

WHY HAVE YOUR RECOMMENDATIONS REGARDING WHEN TO NEUTER CATS CHANGED?*

Expedites surgery before coming in heat, marking, etc, and the procedure is straightforward.

New recommendations about spaying/neutering by 5 months

A movement to neuter cats earlier

Increased incidence of femoral neck fractures if neutering male cats at a young age

Feline Fix by Five. I aim to perform the procedure at 16 to 20 weeks old.

AAFP recommendations have changed to avoid early pregnancy.

New research showing that neutering toms before 1 year old does not affect size of the urethra and therefore does not increase risk of developing urinary blockages

If the cat is a larger breed—Maine coon, for instance—early spay/neuter can lead to femoral head necrosis. We have seen a few of these in practice and it is unfortunate.

I have worked at a low-cost spay/neuter clinic in which these animals did great with the procedure. We avoid unplanned litters, since females can go into heat earlier, and spraying from intact males.

Robenacoxib is not approved under 5 lbs, and it has been a great change to have an approved NSAID for cat surgical procedures.

Almost all client cats are indoor only now, so there is less concern about population control. Maybe it will decrease the problem of urinary blockage.

*These statements are direct responses from survey respondents. Some responses have been edited slightly for clarity.

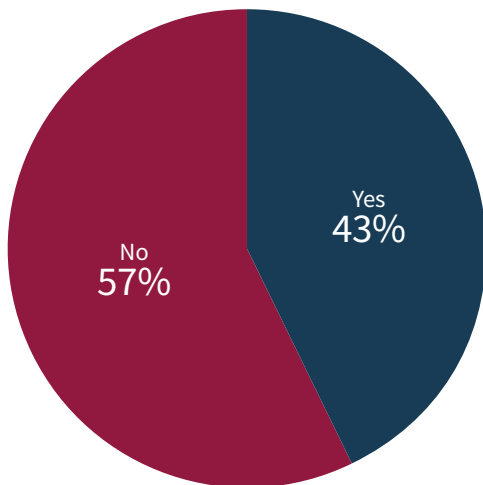
When spaying patients, in which percentage of patients do you typically perform each of the following procedures?

	Average Percentage
Ovariohysterectomy	94%
Ovariectomy	4%
Hysterectomy (ovary-sparing)	0%
Other	1%

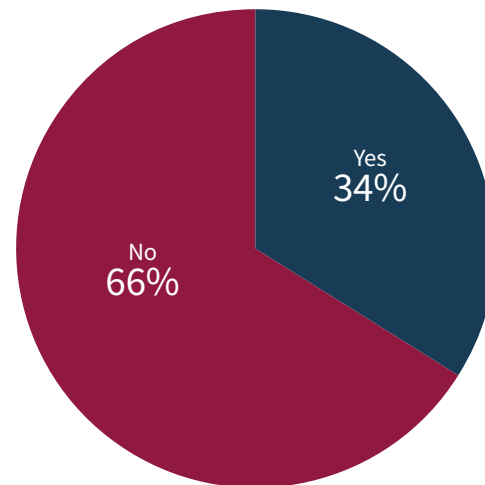
When neutering male patients, in which percentage of patients do you typically perform each of the following procedures?

	Average Percentage
Orchiectomy	99%
Vasectomy	0%
Other	1%

Have you noticed a change in clients' attitudes toward neutering their pet?



Have you been asked by clients for information about performing nontraditional neutering procedures such as hysterectomy or vasectomy?



WHAT ARE THE MOST COMMON CONCERNS VOICED BY CLIENTS ABOUT NEUTERING THEIR PET?*

They worry it will change their pets' personalities and make them less energetic or less good at their jobs if they are hunting or working dogs; lately, more people have become aware of the association with increased risk of certain types of cancers.

With male dogs, they want them to be able to develop a "masculine" appearance. Some clients have heard that not altering can prevent cancer. There is always the concern over anesthesia, but this is not a new concern.

With my clients, usually weight gain, cancers (eg, osteosarcoma, hemangioma), or ACL with larger breeds. Urinary incontinence. Longevity. Mammary cancer if not spayed. Pyometra. Behavior—big question, but I still recommend neutering for aggression.

Only concern comes from breeders wanting the clients to wait to neuter; however, it does prevent those patients from attending doggy daycare and some boarding facilities. Most clients elect to neuter earlier for daycare purposes alone.

Worry about surgery day and anesthesia; worry about discomfort during recovery; worry about keeping their pets quiet during surgical recovery

Age to spay and neuter; behavior changes after neutering; weight gain after neutering; skeletal maturity being stunted after neutering

The possibility of personality changes when neutered too young, or marking/dominance behaviors when neutered too late

Obesity. Hip dysplasia, cruciate injury, or adult size potential. Developing urinary incontinence if spayed before the first estrus

Cost. They feel bad for the pet. They feel it isn't natural for the pet. Concern for anesthesia.

Asking how accurate the Davis Studies are and if altering their pet will cause cancer

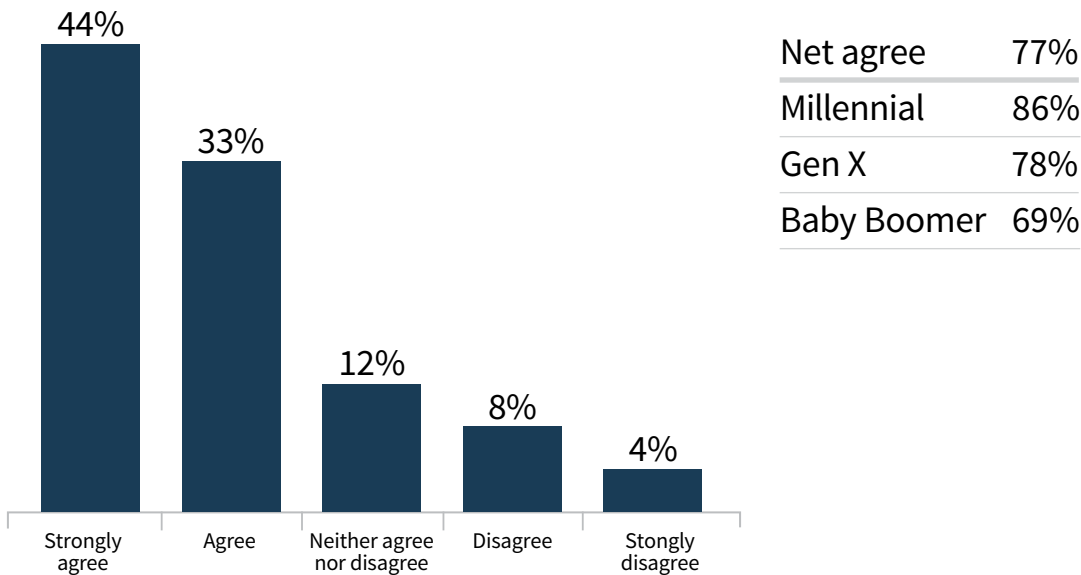
Hunters worry their males won't hunt as well. Other owners worry neutering will change their pet's behavior.

They may want to breed and profit from their pets. They do not seem aware of pet overpopulation concerns.

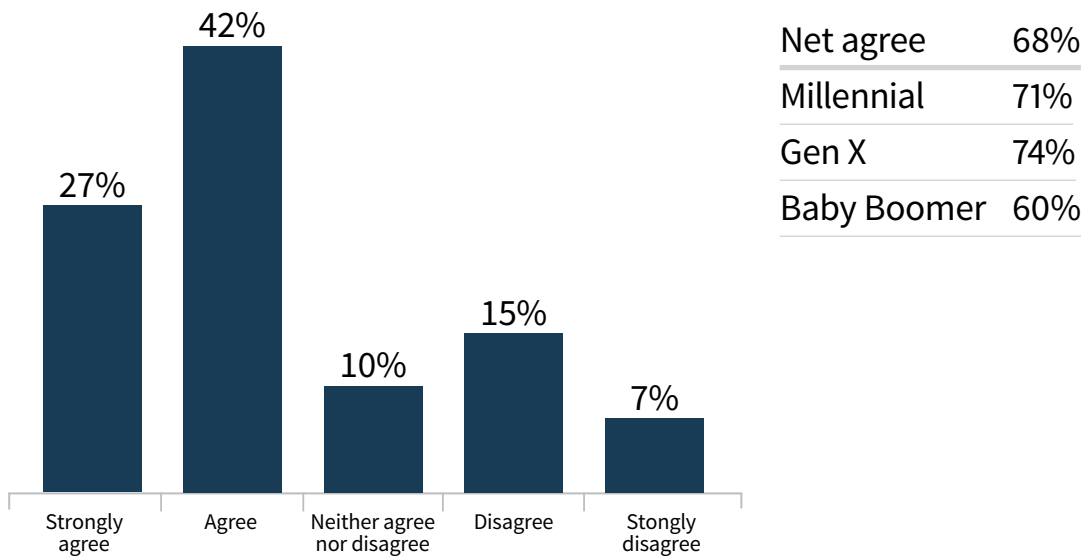
*These statements are direct responses from survey respondents. Some responses have been edited slightly for clarity.

NOTE: For the agree/disagree results on pages 16 to 19, “Net Agree” is the average percentage of respondents who selected "Strongly Agree" or "Agree." Significant differences among age groups are also noted.

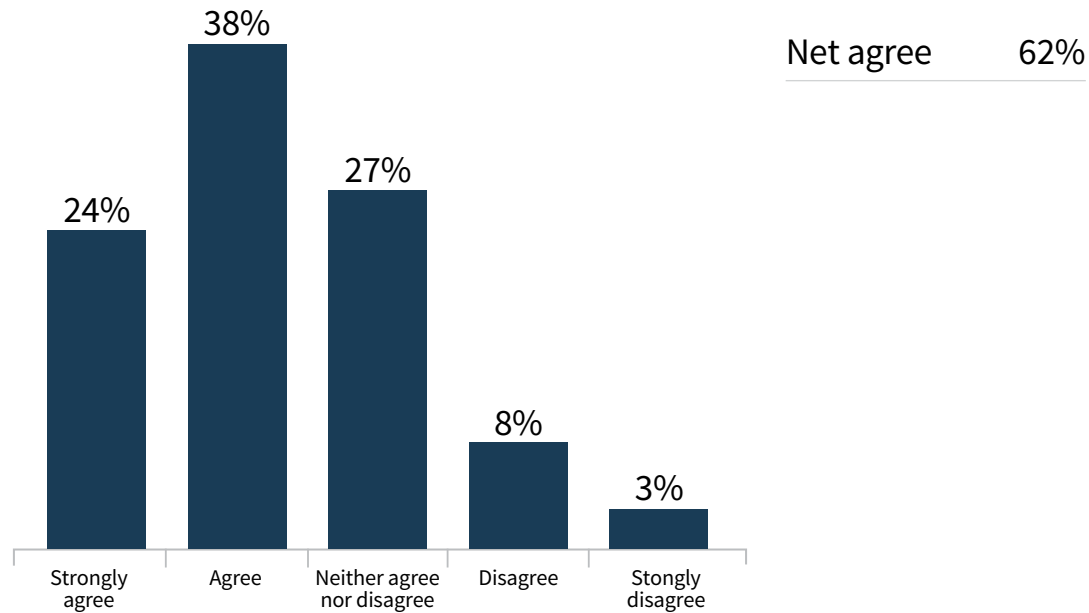
Statement: You should always neuter female dogs and cats.



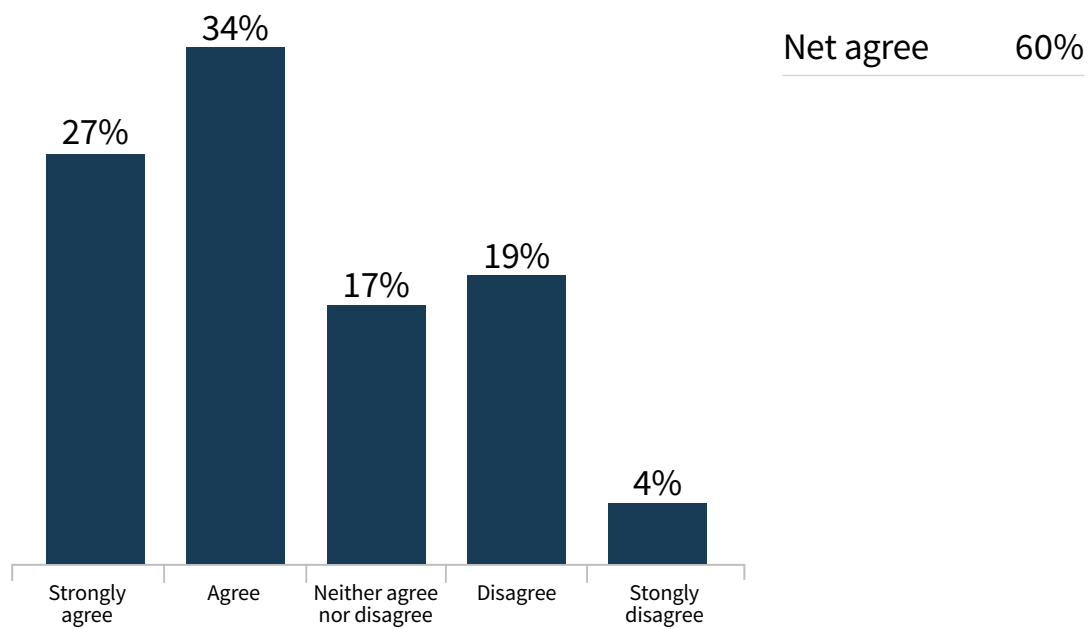
Statement: The decision when to neuter is a trade-off between balancing individual health concerns and population growth.



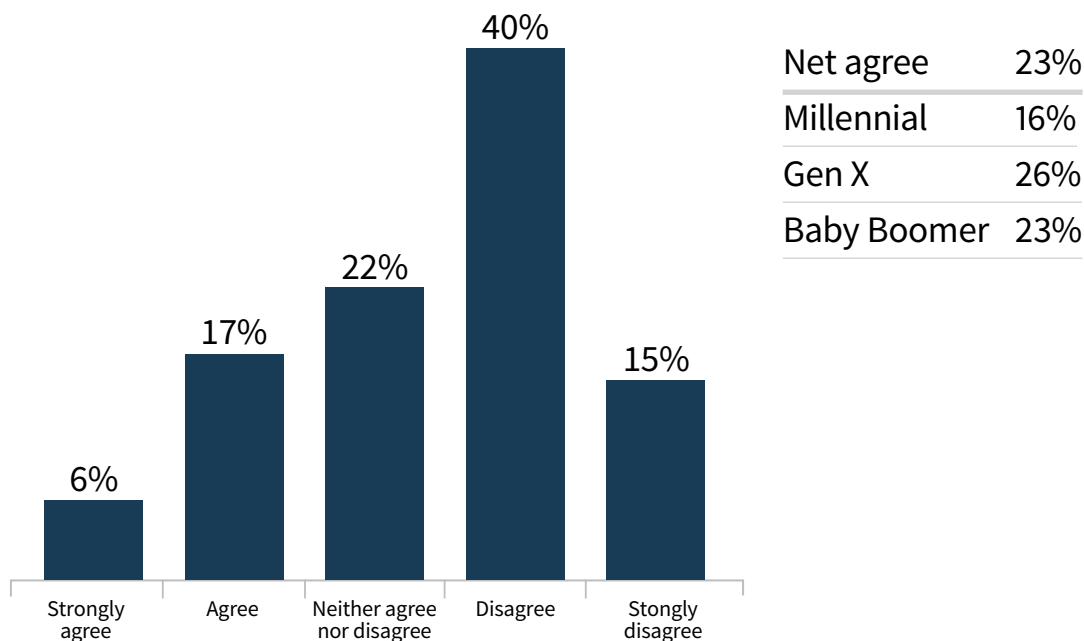
Statement: Pets that are neutered live longer than pets that are not neutered.



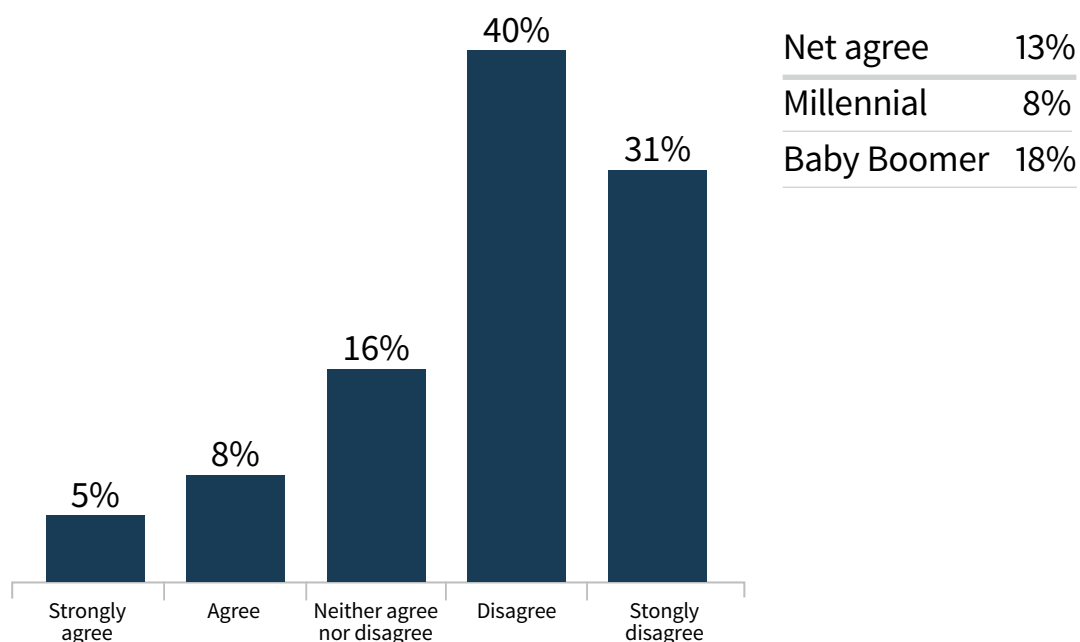
Statement: The benefit of decreased mammary cancer outweighs the possible risk for orthopedic disease in animals spayed before their first estrous cycle.



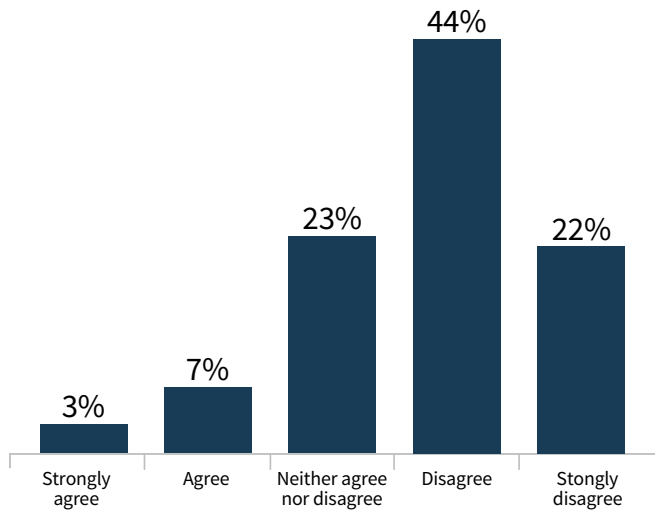
Statement: The benefit (eg, orthopedic health) of not neutering certain breeds of male dogs (eg, Rottweilers, Labrador retrievers) outweighs the risk of behavioral issues that may result.



Statement: If a dog is well trained, the owner should not feel the need to neuter.

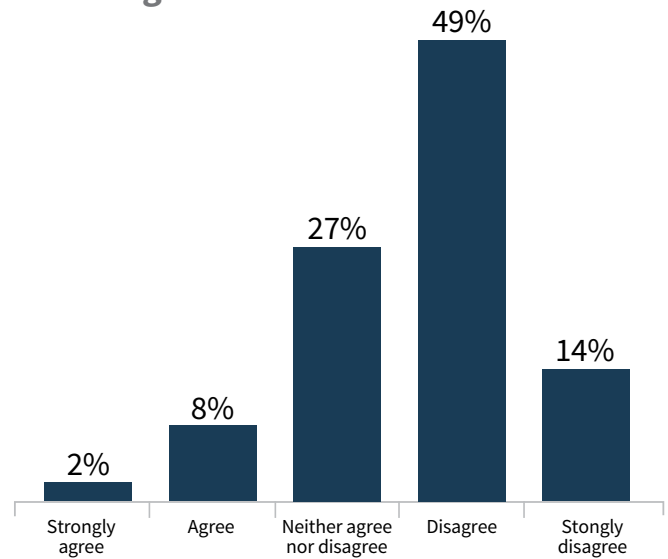


Statement: Cancer risk is unrelated to the pet's age at time of neutering.



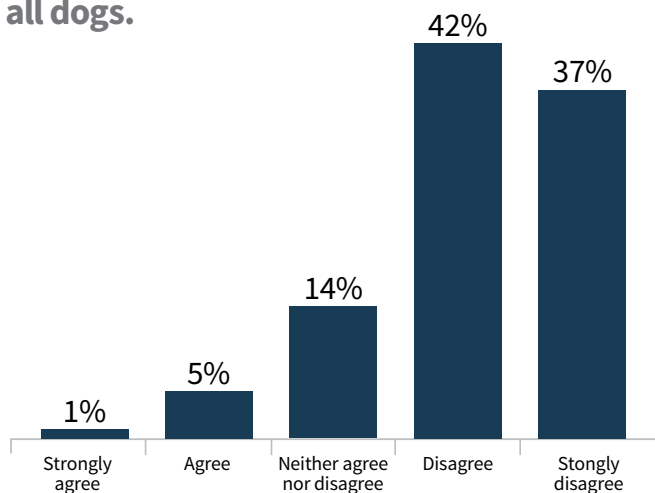
Net agree 10%

Statement: Risk for orthopedic disease is unrelated to the pet's age at time of neutering



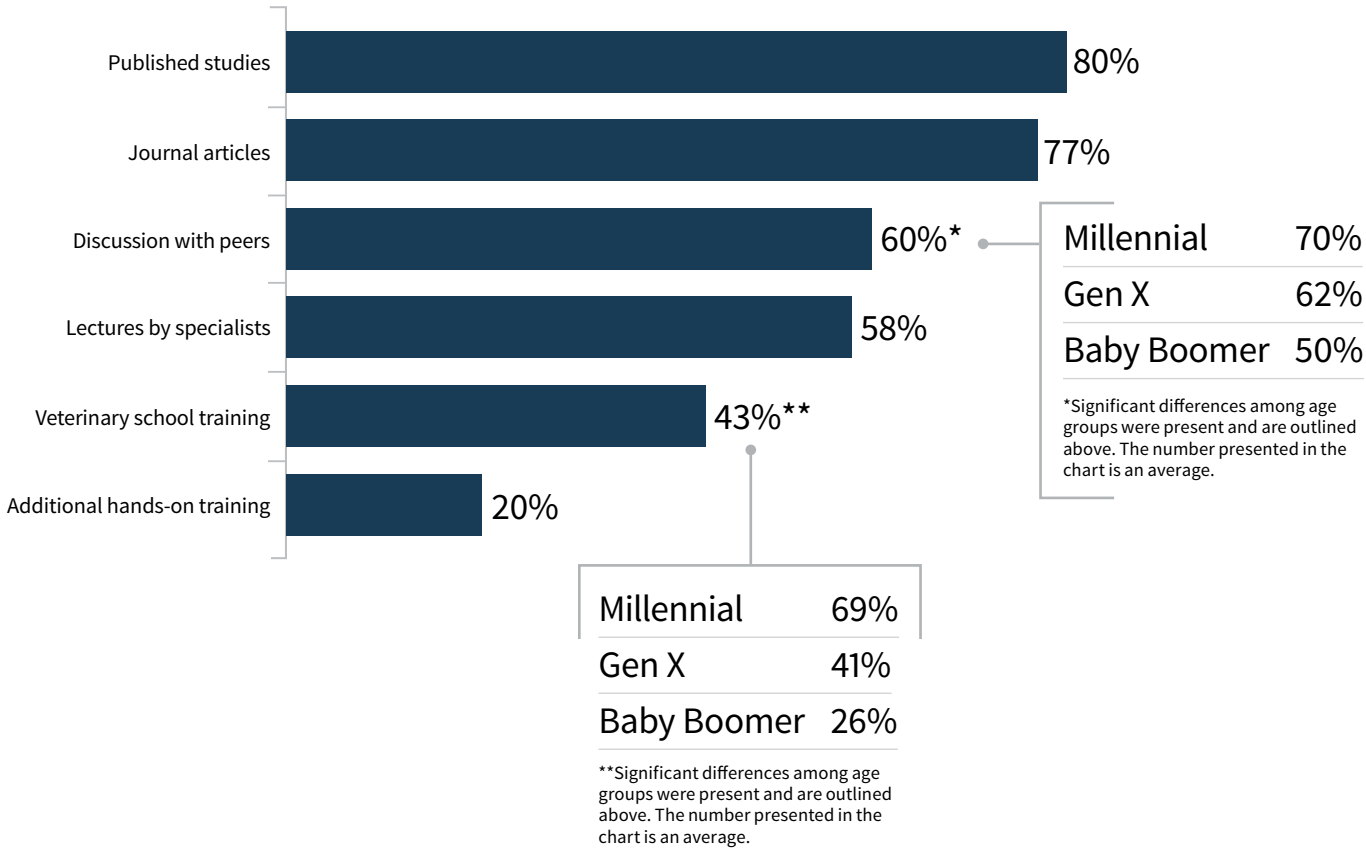
Net agree 10%

Statement: Studies in a small population of a specific breed can be extrapolated to all dogs.



Net agree 7%

What sources of information have guided your recommendations regarding age of neutering?



KEY TAKEAWAYS

- ▶ Counseling pet owners regarding whether and when to neuter their pet should involve discussion of the benefits and risks of neutering.
- ▶ Pet owner views on neutering are widely considered unchanged.
- ▶ Veterinarian recommendations regarding neutering and optimal timing vary for small or medium-sized and large or giant-sized dogs.