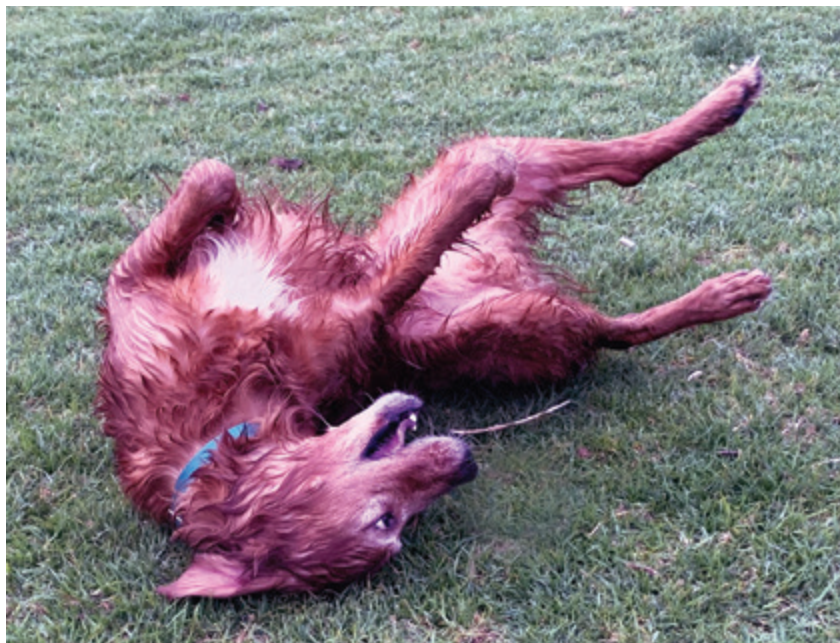




Your complete guide to natural dog care and training

Whole Dog Journal™



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Penance

Trying to make up for an experience that haunts me to this day.

I've been haunted for some years ago by an experience with a shelter dog. The person who does the evaluations of prospective adoption candidates at my local shelter asked me if I could spend some time with the backlog of dogs waiting for assessment; she asked me to hang out with them and make some notes about them.

There was one dog I particularly liked; a Rottweiler- or perhaps a Swiss Mountain Dog-mix. She was cute, friendly, and smart. I recommended that she advance to the adoption row, and photographed her so she'd have a nice promotional picture on the shelter website. But a day later, I got a call from the evaluator (who is also a friend). "I know you really liked that big black dog in kennel 9," she said, "but I wanted to let you know that I'm not going to advance her." That was meant to be a gentle euphemism; I knew she meant euthanasia. I was shocked; I thought the dog was lovely. "Oh, shoot. Why?" My friend heard the emotion in my voice and said, "If you want, you can come back and I'll show you what I didn't like."

The next day I spent about a half-hour playing with the dog; I still really liked her! Then my friend joined me, and we put a leash on the dog and led her into a quiet room in the shelter. I decided to take video of the assessment; the photo that appears on the cover and also on page 9, accompanying WDJ Training Editor Pat Miller's article on resource-guarding, is a still taken from the video I recorded.

My friend put a bowl full of canned dog food on the floor for the dog, who dove right into the moist stew. And then my friend used a tool that is widely employed by shelters in these food-guarding evaluations, a rubber hand on the end of a stick. It enables the evaluator to pretend to reach for or pick up the dog's food while she's still eating it, so it can be ascertained whether the dog will display any guarding behavior, without any person actually being bitten.

In less than a minute, the dog sped right through *all* the behaviors listed on the "resource-guarding assessment form" we've reproduced on page 10: freezing, growling, flashing a "whale eye," flipping the bowl away from the hand, snarling, gesturing with her head toward the hand, performing an "air snap" in the direction of the hand, and finally, giving it a solid bite. And after she finished the food, she appeared to go right back to being the sunny, friendly dog I liked so much.

I was stunned; I hadn't ever experienced a dog like that. I told my friend I understood and trusted her judgment – but, days later, I was still having second thoughts. I called and asked Pat Miller: "Can behavior like that be modified?" and she assured me it could. But the dog was already dead.

I hope that Pat's insights and recommendations in this article can save some other "guardy" dog's life – and keep his or her family safe, too.



NK



On a Roll

*Why do dogs roll in stinky things?!
And what can you do about it?*

The walk starts innocently enough. Then you realize your dog, who has scampered ahead of you, has hit the ground and is writhing gleefully atop an odoriferous animal carcass or some excrement of unknown origin.

Sound, or, perhaps more accurately, smell familiar?

Most every dog owner can recount tales of their canine companions having rolled in something stinky, often at the most inopportune time, like shortly following a bath. Why do dogs do this? And why do they always choose odors that are maximally offensive to us, like dead animals or poop, and not the lovely lavender patch?

Truth is, we don't specifically know, but there are several theories out there:

■ **Stink facilitates stealth?** Many have suggested the behavior is an evolutionary carryover from dogs' days as wild predators, noting the tendency of wolves to roll in feces and atop animal carcasses. Some biologists have suggested this behavior could be designed to assist with hunting by masking or camouflaging a dog's own predator scent in an effort to more effectively sneak up on prey.

Stanley Coren, Ph.D., author of several books about dog behavior and "Canine Corner" columnist for *Psychology Today*, notes this idea makes both evolutionary and adaptive sense. He explained that if an antelope smelled the scent of a wild dog, jackal, or wolf nearby, the antelope would likely bolt and run for safety. But, because antelopes are used to the smell of their own droppings and carrion (decaying flesh) is common on open plains, "prey animals are less likely to be frightened or suspicious of a

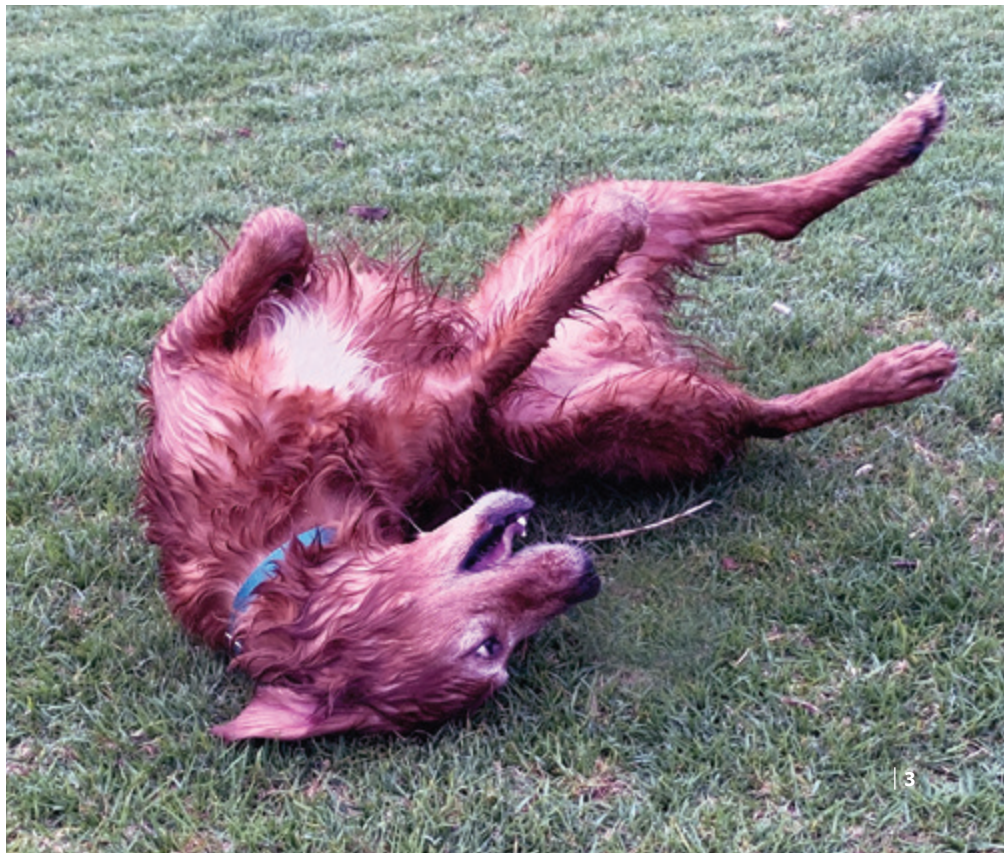
hairy thing coated with that smell," he wrote in one of his columns.

Renowned behaviorist and author Patricia McConnell, Ph.D., is skeptical about that theory. In a 2015 blog post exploring potential reasons why dogs roll in substances that we find to be highly unsavory, she points out how "most prey animals are highly visual, and use sight and sound to be on alert for predators."

She argues that, first, hoofed animals have greater peripheral vision due to the placement of their eyes, and they have ears that "swivel around like mobile satellite dishes." If a prey animal's sense of smell is adept enough to recognize predator scent, says McConnell, the animal can likely recognize that scent even when layered with the similar scent of its same species, or that of carrion from the surrounding area.

Finally, some scientists have noted that, while wolves sometimes ambush their targets

Most dogs enjoy a good roll on the grass; it helps scratch their itches (and helps stretch and adjust their spines in the process!). To our horror, many dogs also seek out strong-smelling substances to roll in, seeming to take delight in covering their shoulders, necks, and heads with a greasy fish carcass, cat poop, or any dead animal they could find.





while hunting, it's more common for them to chase down prey, lessening the need for as stealthy an approach.

■ Advertising access to resources?

Another theory is that rolling around in feces or atop a carcass is a way to share valuable information with other dogs. Researchers at Wolf Park in Battleground, Ind., have found that wolves often followed a scent to its source after smelling it on a pack-mate. In the wild, returning to the pack awash in *eau de* dead animal might help lead others to a source of food. At the very least, it advertises one's ability to access a valuable resource, which can make for an attractive mate.

■ **Is it about the dog's scent?** A lesser-supported hypothesis is that the rolling behavior might be to distribute the dog's scent onto the stinky item, rather than the other way around. This seems like a largely ineffective method compared to marking with urine or feces, especially when dealing with matter so pungent, so experts believe this is unlikely.

■ **It's fun?!** There's no mistaking a dog's sheer delight as they roll about, often oblivious to our despair. Some scientists believe the behavior triggers a rush of dopamine, a neurotransmitter involved in reward and pleasure. While the behavior likely served an important function in dogs' evolutionary past, for today's domesticated dogs, that function has vanished, but the behavior remains because it feels good.

My own dog is known for his daily exuberant rolls in the park, usually commencing after a few happy retrieves of a favorite ball. He'll trot a few steps away, lie down, and proceed to flip belly up, legs flailing as his body lurches side to side. His tongue hangs from his mouth and he snorts in delight, looking absolutely joyful. To me the message seems clear: Let the good times roll!

WHAT CAN YOU DO?

As with many things in dog training, an ounce of prevention is worth a pound of cure. If you're likely to encounter nasty things in which your dog will want to roll, keep him on-leash! If using a long line or allowing your dog off leash, pay attention to your dog! Time with your dog, especially when you've chosen to let him off leash, should be spent engaged with your dog, not your mobile device.

1 PRACTICE NAME RECOGNITION.

Teach your dog to quickly orient to you when you say his name. Begin this behavior in a familiar area with few to no distractions and work your way up. With your dog on leash, casually maneuver so that you're behind him. Say his name. When he turns to look at you, mark the moment using a clicker or marker word such as "Yes!"

Australian Kelpies were historically bred to work sheep; a hardy and tough breed, they also excel at herding cattle. This Kelpie-mix loves cattle . . . poop! She covers herself with fresh, wet cow poop any chance she gets, so, no more off-leash walks in cow pastures!

We may not know why dogs roll in smelly substances, but there is no mistaking the look of joy and delight on a dog's face for anything else when they are hard at it.

and offer a treat paired with praise and enjoyable petting.

If he *doesn't* turn around, repeat his name up to two more times, using a happy, upbeat tone of voice. If he hasn't turned around after three tries, playfully tap him on the rear to get his attention, praising him enthusiastically as he turns around. From there, evaluate the situation to determine what made the behavior so challenging. Likely, he was distracted by something and the "pull" of the distraction was too great.

Before trying again, make a point to move away from the distraction, stacking the deck in your favor that he'll be able to respond to his name within three tries. The goal is to make it easy for him to be correct. The more we can reward the desired response, the more we'll see the desired response and the faster it will happen.

When this behavior is solid, the dog should happily turn toward you, if not return to you, in anticipation of a reward. Use this behavior randomly while on walks to build and maintain a strong reinforcement history. It's a great way to keep a dog out of trouble, especially when he's off leash.

When my dog appears to be taking interest in something – especially if I



can't see what it is – I use his name (or formal recall cue) to call him back to me and we approach together. If the item is on the “approved list” he's free to check it out. If not, I've prevented an unwanted situation.

2 TEACH A SOLID RECALL. As a trainer, I can't stress this enough. The single most important behavior you can teach your dog is to reliably come when called. A dog who comes when called is more likely to earn the freedom to safely experience off-leash adventures in appropriate settings and is overall safer in general.

Enjoying some off-leash time along the river? Notice your dog sniffing a rotting fish along the shore? Call her back to you before she escalates her sniffing to the roll of doom! (See “Rocket Recall,” WDJ September 2015; “Games for Building a Reliable Recall,” September 2014, and “Training Your Dog to Execute an ‘Extremely Fast’ Reliable Recall,” September 2012.)

3 REWARD ALL NATURAL CHECK-INS. As you walk with your dog, especially when he's up ahead of you via a long line or when he's off leash, pay attention to the moments when he pauses and looks back at you or chooses to return without being called. Reinforcing these natural check-ins with praise, petting, and the frequent addition of treats reinforces the idea that you're walking together.

The more you're walking in partnership with your dog, the greater the chance he can still happily explore the environment without becoming so fixated on any one thing (like something gross he wants to roll in) that he ignores your attempts to redirect his attention or call him away from something gross.

4 ANTICIPATE PROBLEM AREAS. If you can predict where or when your dog is likely to roll in something foul, don't give him the opportunity to do so. Maybe it's the parkway flowerbed three doors down, the one the neighborhood cats routinely use as a litter box.

Getting Rid of The Stench

If you find yourself needing to bathe an especially stinky dog, we recommend the age-old recipe for de-skunking a dog, as the combination of the two main ingredients effectively break down natural odors. Mix one quart of 3% hydrogen peroxide with ¼ cup baking soda in a bucket or large bowl. Stir in a teaspoon or two of grease-cutting liquid soap; using a grease-cutting soap is important because many foul-smelling, organic substances are oily. Make sure the hydrogen peroxide is fresh and fizzy; it's an unstable compound that, over time, will break down and lose its effectiveness as an odor neutralizer.



Rub the mixture into the dog's coat, avoiding the eyes and lips (it stings!), and let it sit briefly before rinsing. Don't wait too long to rinse, as the peroxide can bleach the coat. Do not attempt to store any leftover formula; the combination of ingredients can explode if left in a bottle.

There are also several deodorizing shampoos available commercially. We've heard good things about Durvet Naturals Basics Deodorizing Shampoo and Nature's Miracle Skunk Odor Remover, which works on a variety of odors, not just skunk spray. The Nature's Miracle product is also safe to use on clothing and carpet.

As a dog owner, it's never a bad idea to keep an odor-removing product on hand – just in case! – so they don't have to be left to spread the stink around while you are out buying something to get it off of them!



If you've been burned by your dog's stop, drop, and roll antics, don't let him pull you toward the danger zone, even if it seems he only wants an innocent sniff. Keep your dog's attention on you as you approach and pass the flowerbed of doom using upbeat conversation and praise paired with treats and a favorite toy as necessary. Make not stopping to look for cat poop in which to roll more fun than doing so.

DAMAGE CONTROL

If your dog does manage to hit the deck and adorn herself in something gross, don't get mad at her. After all, she's engaging in perfectly normal dog behavior, and we, as her handler, gave her the opportunity, even if by accident.

Instead, focus on interrupting the behavior as quickly as possible to minimize the damage, and be sure to praise as soon as she's on her feet. This can take great self-control, especially when you're now standing

next to a stinky, manure-covered canine, but it's important to reward her compliance.

It's always a good idea to keep a cleanup kit in your car. Dogs will be dogs, and we never know when an innocent walk in the park will result in a muddy or stink-covered canine. My dogs ride in crates, which makes it super easy to contain a mess.

If that's not an option, a couple of towels, a large jug of water, and an old sheet to fully protect the car's interior will go a long way toward getting everyone home – or to the nearest groomer – as cleanly as possible. Another great suggestion is to add an old t-shirt to the cleanup kit and make the offending dirty dog wear it as a barrier between the grossness and your car. 🐾

Stephanie Colman is a writer and dog trainer in Southern California. She works in the puppy department at Guide Dogs of America, helping to recruit and manage volunteer puppy raisers.



HEALTH

Canine Ulcers

Anyone who has ever had an ulcer (or the heartburn indicating that an ulcer is developing) knows the discomfort that ulcers cause. Yet few recognize the same symptoms in their dogs!

Gastric ulcers can be a pain – causing indigestion, reflux, and discomfort. But did you know that your canine friend can also develop this problem? It's true!

The problem with gastric ulcers in dogs is that they can't tell us when they have heartburn. The symptoms can be very subtle and may often be misdiagnosed or overlap with other conditions. Further, the problems that are often associated with ulcers in humans (stress and *Helicobacter pylori* infections) are not well-described or understood in dogs.

Canine ulcers are usually gastroduodenal – meaning they are located in the stomach and upper intestinal tract, specifically the duodenum.

The stomach is comprised of four layers: The innermost is the mucosa, which is generally protected from the stomach acid by several important physiological mechanisms.

The next layer is the submucosa, then the muscularis, the muscle that moves and contracts to cause peristalsis, the movement of the gastrointestinal (GI) tract. Lastly, on the outside, is the serosa.

An ulcer is a spot in which the normal, healthy tissue has been eroded away. The spot becomes irritated and friable, and bleeds easily. Ulcers can involve only the mucosa or can go full thickness through to the serosa (or any layer in between). *W*

hen the serosa is involved, the ulcer is considered perforated, as now the stomach contents can leak outside of the GI tract.

SYMPTOMS

The symptoms of a canine ulcer are varied and include decreased appetite, frequent burping or regurgitation, lip licking and drooling, vomiting with fresh or digested/dark blood, weight loss, abdominal pain, and dark, tarry stool (called melena). Of these, about 90% of dogs will present with vomiting.

Because these symptoms can represent an extremely large variety of problems, a thorough physical examination with your veterinarian is the first step in addressing these concerns.

There are no specific breed, sex, or age differences in patients with gastric ulcers. It is interesting to note, however, that extremely athletic dogs such as Iditarod sled dogs do have a higher prevalence of gastric ulcers. If you have an agility dog with

If your dog frequently burps, regurgitates, and licks her lips, she may be signaling discomfort from an ulcer and/or an H. Pylori infection.



these symptoms, gastric ulceration should be on the list as a possible cause. It is not well understood why this is the case.

CAUSES

There are a number of things that can cause ulcers in dogs.

■ **NSAIDs/corticosteroids.** The best-known cause of canine ulcers is the use of non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids (such as prednisone and dexamethasone).

These drugs are amazing and useful for many conditions like acute injury and arthritis. As a result, they are prescribed frequently. Both decrease inflammation by inhibiting prostaglandins (PGs). However, if the dog's prostaglandin levels are decreased too much and/or for too long, stomach ulceration can occur, since PGs are critical for maintaining a healthy stomach barrier against acid.

While NSAIDs are extremely beneficial drugs for the management of pain, they do not come free of side effects and risks. Therefore, when managing painful conditions, it is reasonable to start with alternative and complementary therapies such as physical therapy, joint supplements (e.g., glucosamine and chondroitin), fish oils, and acupuncture prior to using NSAIDs.

Unfortunately, steroids are critical for the management of certain autoimmune conditions such as immune-mediated hemolytic anemia and thrombocytopenia. In those cases, they cannot be avoided, so monitoring for the symptoms of gastric ulceration is critical.

Important: Steroids and NSAIDs should almost never be used in combination. There are rare cases such as autoimmune diseases where high doses of steroids will be used with very low doses of aspirin, but these are specific conditions. In most cases, the two should never be administered together. Doing so significantly increases the risk of life-threatening ulcers.

H PYLORI AND CANINE ULCERS

Helicobacter pylori is well known as a cause of gastric ulceration in humans. This bacteria infects over 50% of people, though many never have symptoms.

H. pylori has also been isolated in dogs. However, its significance in relation to gastric ulcers in dogs is unknown. The GI tract of some dogs can be populated with *H. pylori* even though the dog never has symptoms of GI problems, while others have symptoms but no *H. pylori*.

If gastric ulcers are present, and a cause cannot be found, *H. pylori* may be the culprit. It can be diagnosed either with a biopsy taken during endoscopy or by appropriate empirical therapy. Treatment is a month of the antibiotics metronidazole and amoxicillin, as well as antacids such as famotidine (Pepcid) or omeprazole (Prilosec).

It is also crucial to remember not to administer over-the-counter products to your dogs. Ibuprofen, naproxen, meloxicam, ketorolac, and aspirin are all human NSAIDs. These can be extremely toxic to dogs, leading to gastric ulceration and kidney failure.

■ **Endocrine disorders.** Both Addison's disease (a lack of cortisol) and Cushing's disease (an excess of cortisol) are known to predispose to gastric ulceration. If your dog has either of these conditions, your veterinarian should be on the lookout for gastric ulcers.

■ **Acute and chronic kidney disease.** As kidneys fail, the body loses its ability to rid itself of toxins. Gastric acid levels go up, leading to ulcers. The signs of kidney disease can be exactly the same as that of ulceration, so treatment for both is usually started.

■ **Tumors.** Mast cell tumors are common in Boxers and other breeds. They secrete histamine (responsible for allergic reactions), which increases gastric acid secretion and predisposes to ulcers. Gastrinomas are tumors found in the stomach and will also release large amounts of gastric acid.

■ **Other, less common causes.** These include liver disease, inflammatory bowel disease, foreign bodies, and ingestion of caustic materials.

DIAGNOSIS

If your dog has symptoms of gastric ulceration, the first step is consulting with your veterinarian. A thorough physical exam and diagnostics are needed to rule out many of the above causes. This will include a nose-to-tail physical and bloodwork such as a complete blood count and a chemistry panel.

Findings may include anemia and low proteins (from blood loss though the ulcer) and an elevated blood urea nitrogen (BUN). In some cases, white blood cell counts may be elevated in response to inflammation.

Other tests that your veterinarian may be able to do include a barium study and abdominal ultrasound. In a barium study, a large amount of bright contrast is given to a dog by mouth. Radiographs are taken immediately and then at various predetermined intervals. The barium shows up bright white on x-ray. It can show defects in the stomach.

Ultrasound can also be used to evaluate for ulcers, although they can be very difficult to see. If a stomach mass such as a gastrinoma is causing

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the ulceration, then ultrasound may be able to identify it.

Specialized testing can more definitively diagnose an ulcer. Endoscopy is the gold standard, but this isn't available at many clinics. Generally, you must be referred to a specialist for an endoscopy, which will be done under anesthesia. While asleep, a camera is passed down the esophagus and into a dog's stomach and upper small intestine. Frequently small samples are taken (biopsy) for definitive diagnosis. The results can take one to two weeks.

TREATMENT

Treatment for gastric ulceration depends on the underlying cause. If one is not found, then general treatment includes antacids, a bland diet, and gastroprotectants such as sucralfate. If a bacterial cause is considered (see "H. Pylori and Canine Ulcers," page 7), then a specific therapy with antibiotics is recommended.

The major classes of antacids are proton pump inhibitors (PPIs) and H2 blockers. Both work in slightly different ways to lower gastric acid production. Famotidine (Pepcid) is an H2 blocker, while omeprazole and pantoprazole are PPIs.

Carafate (sucralfate) is another drug frequently used in the management of ulcers. It is a soothing agent that coats ulcerated areas. It is given as a tablet dissolved in water (a slurry). It can be give up to three

times a day for relief of discomfort.

Other approaches may include a bland diet such as boiled chicken and rice. Probiotics can be added to food to maintain normal GI flora populations. Slippery elm and ginger may have some positive effects on GI ulcers, as well.

Perforated ulcers are severe, life-threatening emergencies. A perforation occurs when the ulcer has eroded completely through all four layers of the stomach or intestine. This allows leakage of bacteria-laden stomach and intestinal fluid into the abdominal cavity, leading to massive inflammation, infection, and sepsis. Treatment for perforated ulcers includes stabilization of shock and infection followed by surgery to repair the ulcers.

PROGNOSIS

Prognosis varies and depends on the underlying cause. For uncomplicated ulcers and ulcers related to *H. pylori*, prognosis is good with appropriate treatment. It is important to know that they can recur. Discontinuation of NSAIDs and steroids (when possible) will improve the prognosis for cases related to these medications. In the case of perforated ulcers, prognosis is guarded. 🐾

After nine years in emergency medicine, Catherine Ashe, DVM, now works as a relief veterinarian in Asheville, NC, and loves the GP side of medicine.



A dog is placed under full anesthesia and intubated in preparation for an endoscopic exam. His mouth is held open with an instrument so the veterinarian has plenty of room to insert and maneuver the endoscope. The instrument can be used to take pictures and samples of the stomach tissue for biopsy – the only sure way to 100% confirm an H. pylori infection.



Changing of the Guarder

Until recently, food-guarders would be euthanized by most shelters. But attitudes about guarding are changing, because we now know the behavior can be managed or modified.

Resource-guarding – that is, protecting valuable possessions – is a natural, normal canine behavior. Yet at some point we humans developed the arrogant and misguided belief that we should have the right to take anything away from our dogs, any time we darn well please, and our dogs should have no right to object. Dogs who attempt to protect their valuable resources in their humans' home tend to be punished, sometimes severely.

Until very recently, shelter dogs who exhibit resource-guarding were almost always met with a more permanent outcome: euthanasia.

Should dogs really be met with cruelty or death because they'd prefer not to share their food, toys, or bed?

I'm a passionate advocate for families who want to adopt from a shelter and want a dog who won't hurt other members of their family. But I also believe that many dogs who exhibit resource-guarding in the highly stressful environment of a shelter can be safely incorporated into many family homes.

ASSESSING GUARDING IN A SHELTER

Most shelters use some sort of behavior assessment, formal and structured or informal and ad hoc, to determine which unclaimed or relinquished dogs should advance to the shelter's adoption program or be designated for behavior modification, and which should be deemed "unadoptable." In recent years, the behavior assessments that are most widely employed by shelters have come under fire due to studies that suggest that they are not predictive and not replicable.

"Not predictive" refers to the studies'



findings that behaviors presented by dogs during a shelter assessment are very often never seen in the adoptive home – and, conversely, behaviors not seen in the shelter assessment often *do* occur after dogs are placed in homes.

"Not replicable" means that results of one shelter staff person's assessment of a dog may be entirely different if the same dog is assessed by a different person, or on a different day. Both of these flaws put the validity of the assessment tools into question.

In our view, given that aggression is caused by stress, and even the best shelter in the world is a stressful place for almost any dog, it's not surprising that a stressed shelter dog might be more likely to snap and snarl when pressured in the presence of a high-value resource – or in response to some of the other provocative procedures in an assessment.

The findings of recent studies about assessments put responsible shelters in a difficult position. How do they best ensure they are not putting dangerous dogs into

Many (if not most) shelters use some sort of test to determine whether a dog exhibits a tendency toward resource-guarding, using a high-value food (like canned food) and a rubber hand on a stick (as seen above). The dog is allowed to start eating the food; then a handler attempts to stroke the dog gently with the hand, and then move – increasingly insistently – toward the food bowl. On the "shares easily" end of the spectrum, dogs couldn't care less about the intrusion; at the opposite extreme, the dog exhibits dramatic guarding behaviors.

Note: This article deals with dogs who guard items from humans only. Guarding between dogs requires a different level of management and type of behavior modification. For more about dog/dog guarding, see "Mine, All Mine," WDJ October 2011.

the hands of the public if they cannot trust the results of their assessment protocols? There are no easy answers – but there *are* things that shelters can do to keep from killing dogs who are unlikely to cause harm after being adopted into a family environment:

- Realize that resource-guarding is, indeed, a natural and normal canine behavior, especially for a dog who is living in a stressful environment.

- Be more forgiving when a dog exhibits some tension over a valuable resource during the assessment process. Rather than an immediate “You failed!” response when a dog tenses or growls, gently pursue the process (assuming a fake hand is being used). During my long career working with shelters and doing assessments, I have seen a significant number of dogs de-escalate their level of tension when the assessor remained calm and continued the process with gentle persistence.

“The time is long past for resource-guarding to be a capital offense for our canine companions.”

- Recognize that a dog who stiffens and growls during the procedure is communicating, not attacking. She is saying, “This is mine and I don’t want to share.” If you proceed (inappropriately, in her estimation) after giving you a polite warning, she may escalate to a more intense, “I really mean it; this is mine and you can’t have it.” Though her behavior may seem aggressive to inexperienced dog owners, the dog is actually showing admirable restraint and still may be a good adoption candidate for

an appropriate home, without further intervention needed.

- If the shelter is uncomfortable placing dogs who exhibit the kind of behavior described above, its management could establish a behavioral foster program. Staff and/or volunteers who are knowledgeable and capable of working with behaviorally challenging dogs can assess and work to modify their guarding behavior in the shelter.

Alternatively, the dog could be placed in a foster home (with one of those experienced dog-savvy volunteers or staff members) to see if this is one of those behaviors that ceases when the dog is no longer dealing with the stress of the shelter environment.

- Continue to consider dogs who show an extreme response to a reasonably mild threat to their resources as not-adoptable, unless the shelter has the expertise and

SHELTER ASSESSMENT RESOURCE-GUARDING CONTINUUM

This table is an assessment form for a resource-guarding evaluation. The left column describes possible responses that a dog might exhibit to a test in which the dog is given a valuable resource, such as canned food or a favorite toy, and then a handler attempts (with an artificial hand on a stick) to take the resource from the dog. Dogs who display behaviors marked on the “Shares easily” end of the spectrum could be placed in any home. If their responses were

marked somewhere in the middle of the spectrum, they were placed for adoption with restrictions (such as “no small children” or “experienced home only”), moved to the shelter’s behavioral foster program, or sent to a known rescue with behavior modification resources. If, however, their behavior was judged to match the most extreme descriptions at the “Guards Resource” end of the spectrum, they would be judged a candidate for euthanasia.

DESCRIPTION OF BEHAVIOR WHEN ARTIFICIAL HAND IS USED TO SIMULATE TAKING AWAY THE DOG’S VALUED RESOURCE	SHARES WELL ←	→ GUARDS RESOURCE
	----- ----- ----- ----- ----- ----- -----	
Interested in food or object, but will readily and happily give it up.	X	
Continues eating, no signs of uneasiness; mild resistance to giving up object.	X	
Continues eating; mild resistance to giving up object or food.		X
Some tension; eats faster; resists giving or tries to leave with object.		X
Moves muzzle deeper into bowl; resists giving up object.		X
Freeze; low growl; does not move head toward hand.		X
Tension; freeze; whale eye; growl; moves head toward hand.		X
Growl; freeze; whale eye; snap.		X
Bites; responds with strong aggression.		X

The “I Come In Peace” Guarding-Modification Protocol

This guarding-modification protocol, created by my friend and fellow trainer Kelly Fahey, owner of The DogSmith of Hunterdon in Pittstown, New Jersey, is a simple protocol that can be used by shelters, people who have adopted dogs who showed guarding behavior in the shelter or whose dogs started guarding in their new home, and by *any* dog owner with a guardy dog. When done properly, it teaches the dog that a person approaching means *more* good stuff is coming, helping to dispel the dog’s notion that the person might take her good stuff away.

The procedures should be undertaken by one person at first, then generalized to others.

As always, when modifying behavior, we want to remove as many opportunities for the dog to practice the unwanted behavior as possible. If a dog in a shelter is being “guardy” as visitors pass by, she is at risk of being triggered by every passerby, and her behavior will worsen. If possible, such a dog would benefit from being moved to a kennel in a ward without public access and brought out to be shown to potential adopters who seem like a good match.

Note: If at any time you elicit a growl or other guarding behavior, you are too close and/or have proceeded too quickly.

1 Tether the dog to an eye bolt affixed to the wall for that purpose, or to a solid, heavy object. Give her a valuable chew object (not a Kong – it will roll out of her reach) or a small bowl of food.

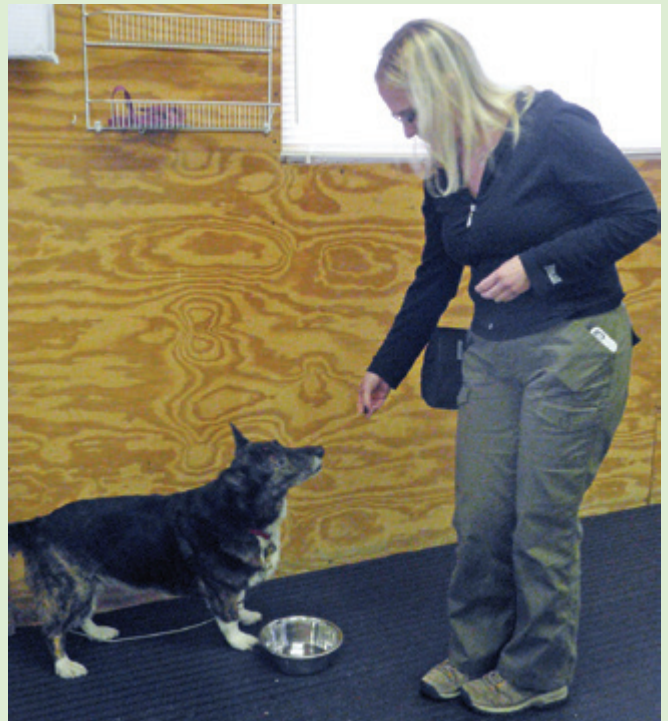
2 Have a good supply of high-value treats that you can toss easily. (Chicken does not work well for this – it’s too messy and hard to accurately toss.) Small bits of cheese or meat work well.

3 Walk past the dog at a safe distance. Depending on the dog, this may be six to eight feet beyond the end of the tether, or it may be closer. As you pass, toss several high-value treats near the bowl or chewy, where she can easily reach them. Keep walking; do not pause to toss. If the dog growls, lunges, or shows other obvious guarding behavior, you are too close.

4 Repeat Step 3 until, as you approach, you see the dog starting to look up in happy anticipation of the treats she expects you to toss. When she does this consistently, decrease the distance between yourself and the dog by a few inches as you pass by.

5 As long as she is consistently happy at each new distance, continue passing by and dropping treats, gradually getting closer to her when you pass.

6 When she is happy with you walking past at a distance close enough to touch her, pause as you pass and feed a treat from your hand. Then walk on.



Lucy has progressed to the point where her trainer is pausing to hand-feed a treat before walking on.

7 When she stays happy with your pause-and-feed, gradually increase the length of time that you pause and feed her treats. The increase should be no more than 1 to 2 seconds. As you increase the length of your pause, start talking in a happy voice as you feed her the treats.

8 When you can pause for about 10 seconds and she stays happy, occasionally bend slightly and drop a treat into the bowl or next to her chewy, then feed some more from your hand and walk on.

9 Repeat, gradually increasing the number of times you bend and drop.

10 Now, gradually increase how much you bend over until you can touch the bowl or chewy. Remember, if you see any sign of tension you have moved too quickly. Back up a few steps and continue more slowly from there.

11 Finally, as you are pausing, bending, and feeding, occasionally play the Trade game, always returning the bowl or object to her after she has happily allowed you to take it.

12 Now, start the protocol over again at Step 1 with another staff member, volunteer, or reliable family member. Continue until the dog is comfortable with a variety of people approaching her. Repeat the process with any new family friends or shelter visitors that can follow your directions, always starting with Step 1.

This 10-pound dog displayed dramatic resource-guarding behavior when he was inherited by WDJ Editor Nancy Kerns through a relative; he might have been euthanized on the basis of this had he landed in a shelter, instead. But in a dog-savvy home without children or other vulnerable people, this behavior was just ignored or managed. He was very small, after all, and not a real threat. If someone needed to take something away from him, they would trade him a treat – easy!

resources to do significant behavior modification.

The shelter that I worked with a few years ago created a continuum that spelled out how dogs who offered varying degrees of resource-guarding behavior would be handled (see the table below). Each possible response corresponded with a specific recommendation. As a result, they began safely and successfully placing many dogs who, previously, would have been euthanized.

WORKING WITH A DOG WHO GUARDS

Today, progressive trainers and shelter managers are aware that resource-guarding behavior can be managed, modified, and/or minimized. It requires understanding that this is a natural, normal canine behavior; a willingness to modify the dog's environment in order to set him up for success; and, depending on the degree of drama that the dog brings to his guarding, a bit of work.

From the outset, adopters of *all* dogs (not just those with a history of guarding) need to be educated that the concept "I should be able to take anything away from my dog" is false and dangerous.

Then, whether the dog is living in a shelter or in a home, the first critical task is to make sure that no one (purposely or unwittingly) antagonizes the dog into aggressive behavior. All staff and volunteers or family members need to be thoroughly trained on procedures for working with the dog and minimizing guarding behavior; obviously, *only* staff or family members who are capable of and committed to staying cognizant and alert to these procedures should



be allowed in the dog's proximity.

When handling any item that has any value for the dog, people need to learn how to safely trade with the dog for anything he might covet, including bowls, toys, or anything he might have randomly grabbed, such as a dropped cell phone or keys (see "Protocol for a Safe Trade" on the next page).

When circumstances prevent a trade from taking place, the dog's handlers should manage the environment to prevent the dog from having an opportunity to guard. For example, in a shelter, the staff might be instructed to move the dog to the other side of a double-sided kennel (and closing the door between them) before picking up items in the kennel; in a home, Mom would be instructed to put the dog outside before she picked up his empty food bowl.

YOU CAN MANAGE

Most resource-guarding behavior is much more easily managed or modified than once thought. In an appropriate adoption home, with family members mature and committed enough to adhere to management protocols, resource-guarding doesn't have to be an issue at all.

The same is true in a shelter with

adequate understanding and resources. Complications arise with young or careless handlers, those who resist the new understanding of guarding behavior, and/or those who may deliberately undermine management protocols.

Nevertheless, the time is long past for resource-guarding to be a capital offense for our canine companions. Dogs have a right to want to keep their good stuff. Manage the home or shelter environment so stress and conflicts over resources don't have to occur. Implement "Trade" and guarding behavior modification protocols as needed to keep everyone safe and happy. And let them live. 🐾

Thanks to Jacob Paxson of The Canine Connection in Chico, California, who demonstrated the do's and don'ts of the "Trade" protocol (on the opposite page) with his dog, Kitty.

Author Pat Miller, CBCC-KA, CPDT-KA, is WDJ's Training Editor. She and her husband live in Fairplay, Maryland, site of her Peaceable Paws training center. Miller is also the author of many books, including Beware of the Dog: Positive Solutions for Aggressive Behavior in Dogs. See page 24 for information on her books and classes for dog owners and trainers.

Protocol for Teaching a Safe “Trade”

Start with your dog on a leash and either stand on the end of the leash or tether him to something solid so he can't leave with the item at any point in the “game.”

1 Say “Take it!” and give the dog a low-value object – something he will easily and willingly give up in exchange for a high-value treat.

2 Offer him your high-value treats – close enough that he can sniff them, but don't try to push them into his mouth. (Anything that resembles coercion will likely increase his resistance.) Have a large enough supply of high-value treats that it will take him a little while to eat them all. Do not use a cue yet.

3 If he drops the low-value item (in order to explore or take the higher-value treats you offered), click your clicker (or use a mouth click or verbal marker) and, while you keep him occupied nibbling at the high-value treats in one hand, pick up the low-value object with your other hand and hide it behind your back. You must use two hands for this! If you let him eat the high-value treats and then race him back to the object, you're likely to lose the race *and* you might elicit resource-guarding.

As soon as he finishes eating the treats in your hand, bring out the object from behind your back, say “Take it!” and give it back to him. This teaches him that he doesn't lose the object – that he can trade with you and then get it right back. This will make him more willing to trade with you again in the future. It's a win/win for him!

If he doesn't show any interest in taking the low-value object after you've traded it for high-value treats, you may need to start by giving him a slightly higher-value object and/or using lower-value trade-treats.

If he *doesn't* drop the item, make a short “Hansel and Gretel” trail of treats under his nose and then trailing a foot or so off to the side. Engage his mouth with the treats in your hand after he follows the trail, while you pick up the item with your other hand.

If he *still* doesn't drop the item, you need to start by giving him an even lower-value item and/or using far higher-value treats in your hand. (Think meat, not dry cookies.)

4 When you can predict that he will always drop the item when you offer your treats, you're ready for the next step. First, give your cue (“Trade!”), pause for a few seconds, and then do what you've been doing: offer the treats, click when he drops the item, and pick up the item with your free hand while you keep his mouth busy nibbling treats from your hand.

5 After several repetitions, sometimes pause a few seconds longer before offering your treats. Your goal is to get him to drop the object when you say “Trade!” – *before* you offer the treats. When he will do this reliably, it means you have the behavior “on cue” – he drops the object because he heard and understood the cue, not just because you stuck high-value treats under his nose.



Don't bend over the dog like this, whether you are feeding her or reaching for the ball. Many dogs interpret this as a threatening posture. ↓



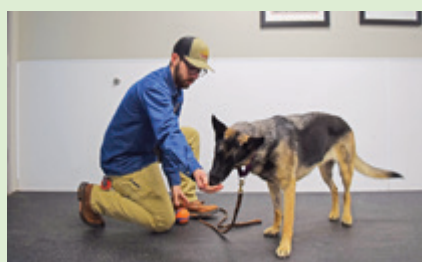
Don't reach for the item if the dog seems to be guarding or is not fully interested in or engaged with the treats. ↓



Don't reach under or over her if she drops the toy on the wrong side of the “Hansel and Gretel” trail (she's still guarding it). ↓



Safer: Jacob leads Kitty away from his body and from the ball with the treats, and watches her closely as he picks up the ball.



Safer: Use higher-value treats to make them more enticing than the item. Watch the dog while reaching for the item.



Safer: Wait for a drop that's easy to reach for without moving into her space or having to race her for it.



On the Horns of a Dilemma

To neuter, or not to neuter: That is the question.



Ask someone who works in a shelter or volunteers in rescue about spay/neuter and you will likely hear all good things. Ask a veterinary oncologist or orthopedist and they might not be as enthusiastic. Now what should you do?

There are any number of third-rail topics that occasionally electrify the conversationally unwary dog owner: Grains or grain-free? Dewclaw removal, cropped ears and tails, or leave well be? Raw or cooked? Flat collars or choke, pinch, or electronic?

But dog owners who came of age in the decades before spay/neuter practices became *de rigueur* are sometimes shocked by the charge, increasingly popular, that sterilizing a dog is tantamount to condemning him or her to a shorter or more painful life. After all, if you are a respectable dog owner, nearly your entire adulthood may have been spent judging people with reproductively intact dogs – especially intact mixed-breed dogs – as supremely irresponsible. What gives? Why the reversal?

Veterinary practitioners have long dithered about what might be the “best” time in a dog’s life to undergo spay/neuter surgery, and some

have theorized that coming to maturation without the benefit of secondary sexual hormones might possibly have deleterious effects on health. There have even been small studies looking for such. But there wasn’t any really impactful data that made the average dog owner question the wisdom of spay/neuter until a 2013 study (Torres et al) out of the University of California - Davis that found a link between neutering and the risk of certain cancers and joint disease in Golden Retrievers.

Since then, there has been a steady trickle of studies (with more on the immediate publication horizon) that examine some aspect or another of canine health and how it may be affected by spay/neuter – and the effect of this unending drip of evidence has been *torture* for many dog owners. We thought we were doing the right thing by sterilizing our dogs!

But is it *really* so bad to subject dogs to spay/neuter? Many of the studies that people cite to support their claims that the practice is unhealthy for dogs are based on statistical-

A NOTE ABOUT TERMINOLOGY

The term “neuter” can be used for both male and female dogs, though it is more commonly used to refer to the process of castration (removal of testicles) in male dogs. Castration is specific to males, as spay is to females.

Spay/neuter refers generally to the removal of the gonads (the male’s testes and the female’s ovaries); that is more accurately called a gonadectomy – but it should be noted that while the female’s uterus and uterine horns are not gonads, they are also removed in spay surgery. Confusingly, “spay” sometimes is used to refer to a hysterectomy – removal of only the uterus and uterine horns. Removal of the ovaries (sparing the uterus and uterine horns) is referred to as ovariectomy.

“Sterilization” is another generic term that is frequently used, but it can refer to a process that induces infertility without gonadectomy.

“Desexing” is a term that has gained popularity in research literature. It’s defined as castration or spaying an animal, but the phrase evokes strong negative connotations for many people, who may fear it refers to somehow removing the biological sex of a dog; it doesn’t!

Since alternative methods of preventing reproduction are not common yet in the United States, almost all of the research looks at dogs that have undergone spay (removal of all reproductive organs) or castration; we will use the terms “spay/neuter” and “gonadectomy” interchangeably.

There are other common terms that refer to the age of gonadectomy. “Early age” or “prepubertal” spay/neuter indicates dogs who have undergone gonadectomy prior to six months of age. “Pediatric” spay/neuter surgery is usually defined as that which occurs between 6 and 16 weeks of age.

ly tiny samples, or dogs of a single breed. Extrapolating the results of highly limited studies to assert that spay/neuter is deleterious to *all* dogs is quite a reach.

To help you understand the modern claims that spay/neuter is bad for dogs, we've looked at dozens of studies examining some aspect of the possible health effects of gonadectomy – the removal of the dog's gonads (sex organs, the testes in males and the ovaries in females). We'll describe the evidence and discuss what it all means – but here is a little hint about our conclusions: You are still going to have to make your own choice about what's "best" for you and your dog. And if your dog is already gonadectomized, that's okay! The evidence is not so cut-and-dried as to support *any* across-the-board recommendations for all dogs.

WHAT DO GONADS DO?

Before we look at the studies that examine the effects of gonadectomy, it's helpful to understand what functions the gonads have in *addition to* reproduction.

Normal male and female dogs each have a pair of gonads.

The male gonads – the testes – reside in the scrotum and produce the male reproductive cells (spermatozoa, sperm for short) as well as androgen hormones that promote male characteristics.

Sperm cells are formed in the seminiferous tubules in the testes; in between these tubules are groups of endocrine cells, called interstitial cells, which produce androgens in response to luteinizing hormone (LH, sometimes referred to as interstitial cell stimulating hormone [ICSH]) secreted from the anterior pituitary gland located in the brain.

The principal androgen produced is testosterone, which is responsible for the development of the male reproductive system and secondary male sex characteristics, such as male body shape and sexual behavior. Testosterone is a steroid hormone that has an overall anabolic effect on the

A brief history of spay/neuter

Early in the 20th century United States, the majority of dogs never saw a veterinarian. Very few were subjected to a procedure that would prevent them from reproducing. (If they were, spays were often performed at 3 to 6 months of age and castration as early as four weeks!)

Many pet dogs were allowed to roam and reproduce willy nilly until the late 1960s and early 1970s, when the stray dog population grew large enough to pose problems in human society, including dog bites, the fear of rabies, and the cost of public animal control agencies needed to deal with dogs and dog-related hazards to human health.

By the early '70s, animal control agencies were impounding millions of dogs every year, and they euthanized most of them. In a 1973 survey of shelters, the Humane Society of the United States (HSUS) estimated that a staggering 13.5 million dogs and cats were euthanized nationwide by shelters. That number of euthanized animals finally sparked enough outrage for society to begin trying to solve the problem.

It was recognized from the outset that efforts to prevent dogs from reproducing would be a critically important weapon in the war on pet overpopulation, with spay/neuter surgery being the most common method of sterilization for dogs.

Prior to this time, in the uncommon event that a veterinarian recommended the procedure to a dog owner, it was presented as a convenience – a way to reduce behaviors the many owners found problematic, such as straying – as well as a way to prevent unwanted puppies. Starting in the mid 1970s, however, dog owners were encouraged to take credit for promoting the well-being of the overall canine population when their dog's potential for contributing to the homeless dog population had been eliminated.

Over the next four decades, the practice of routine spay/neuter surgery became the societal norm in this country. An estimated 85% of companion dogs in the U.S. have undergone elective gonadectomy. According to the American Veterinary Medical Association (AVMA), there are currently no state or federal laws requiring gonadectomy of all dogs in the U.S., and the AVMA "does not support regulations or legislation mandating spay/neuter of privately owned, non-shelter dogs and cats." Some states have proposed mandatory gonadectomy laws, though none have been successful. There are, however, cities and other local governments that have proposed and adopted ordinances regarding spay/neuter laws. Many municipalities require higher licensing fees for intact dogs, sterilization for dogs deemed vicious or dangerous, as well as requiring gonadectomies for all shelter animals prior to release.

Where do things stand today? No statistics are available to prove the rate of spay/neuter compliance is declining, yet conversations among dog owners today demonstrate an increased awareness of the potential detrimental effects of the procedure. No mention of spay/neuter practices can be made online or in print without commentary from owners who have been convinced by whatever critical literature they've encountered (or their personal experiences) that spay/neuter is unmistakably and unambiguously harmful.

We're not that sure.

Understanding history can guide our present day decisions. No one wants to return to a world where more than 13 million dogs are being put to death in shelters annually, and we know that not all dog owners are capable of preventing their intact dogs from reproducing. As history marches on, we look forward to studies that will enable researchers to make more targeted recommendations, so that any owner can find information that will prevent her from choosing a course of action that will hurt her dog more than it helps the overall dog population.

body, promoting protein synthesis and growth of tissues, encouraging the growth of muscle mass and strength, increasing bone density and strength, stimulating linear growth, and supporting bone maturation – all of which results in the larger size and weight of male dogs compared to females of the same breed.

Testosterone also stimulates development of the penis at puberty, the functioning of the prostate (a male accessory sex gland), and activation of sperm formation. Testosterone reaches the highest level in male dogs around 6 to 12 months of age and then it begins to plateau. As soon as a male dog is castrated, testosterone production ceases.

The ovaries are the female gonads, producing the ova (reproductive cells) and the female hormones estrogen (a compound term for the estrus-producing hormones estradiol, estriol, and estrone) and progesterin.

Estrogens are produced by the cells of the ovarian follicles and are responsible for female secondary sex characteristic development, contributing to the maturation of the reproductive organs, control of the reproductive system, and for the behavioral and physical changes that occur in preparation for breeding.

Progestins, and in particular progesterone, are produced by the corpus luteum, a mass of cells that develops from the empty follicle after ovulation; they help prepare the uterus for implantation of the fertilized egg, maintain pregnancy, and promote the development of the mammary glands.

The adult male dog's testes produce spermatozoa and hormones continuously; in contrast, adult female canines produce reproductive cells in cycles, occurring about once every six months.

The estrous cycle is controlled by follicle stimulating hormone (FSH) and luteinizing hormone (LH) from the anterior pituitary gland. Coincid-

ing with this short period of ovulation, estrogen levels rise, followed by a rise in progesterone levels. After ovulation, progesterone levels remain high for several weeks, even if the dog has not become pregnant. When a female dog is not in estrus, her estrogen and progesterone levels are low.

In addition to these reproduction-based tasks, the dog's hormones function as chemical messengers with far-reaching and diverse tasks in the body – and likely include some that have yet to be identified. It should not be surprising, then, that researchers studying the effects of gonadectomy on dogs keep coming up with results that require further exploration.

LOOKING AT THE SPAY/NEUTER LITERATURE

The following is an overview of the major areas of concern regarding the possible adverse health effects of canine spay/neuter and findings from relevant studies. The studies mentioned in the text below (and referenced completely on page 22) are some of the most frequently cited in discussions in veterinary literature.

■ Lifespan

Overall it appears that spay/neuter is associated with an increased lifespan. However, be aware that most of the studies that concluded this looked only at gonadectomy (as opposed to other methods of sterilization) and usually did not take into account the age of spay/neuter.

Furthermore, the occurrence of

having spay/neuter performed may contribute to an increased likelihood of better husbandry and veterinary care, which theoretically has a positive effect on life expectancy.

In the retrospective study by Hoffman et al (2013), the records of more than 40,000 sterilized and intact domestic dogs listed in the Veterinary Medical Database (a collection of data from veterinary teaching hospitals) were analyzed for associations between gonadectomy and lifespans and causes of death. It was found that sterilized dogs lived on average 1.5 years longer than intact dogs and life expectancy increased by 13.8 percent in males and 26.3 percent in females.

The study also found that intact dogs were more likely to die of infectious disease, trauma, vascular disease, and degenerative disease, and sterilized dogs were more likely to die of neoplasia (including an increased likelihood of transitional cell carcinoma, osteosarcoma, lymphoma, and mast cell cancers) and immune-mediated diseases. No causal relationship was found; note that gonadectomized dogs live longer and cancer is more prevalent in older dogs.

The dataset did not include at what age a dog was spayed or neutered, or whether a dog had reproduced prior to gonadectomy.

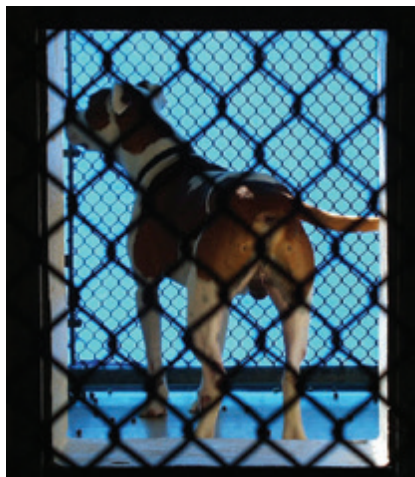
The Hoffman study findings were supported by Banfield's State of Pet Health 2013 Report, which looked at data from Banfield facilities across the nation and included 2.2 million dogs.

■ Orthopedic concerns

The literature review by Houlihan (2017) looks at the research on musculoskeletal diseases and possible associations with spay/neuter. Several studies have found gonadectomy to be a risk factor for development of cruciate ligament disease (CLD) and hip dysplasia (HD) in both male and female dogs.

HD has a high genetic component but is recognized as a multifactorial condition. Incidence of CLD tends to occur in young, active, large breed dogs from degenerative or traumatic

Studies have found that intact dogs are more likely to be relinquished than those that have undergone spay or neuter.



causes, but it has also been correlated to aging, conformational abnormalities, and immune-mediated joint issues.

One focus for recent research is the assessment of the tibial plateau angle (TPA) – the slope at the top of the tibia. The steeper the TPA, the more stress on the ligament resulting in an increase in risk for CLD. Studies have demonstrated that the TPA is steeper in dogs that undergo gonadectomy before the closure of the tibial growth plates. The risk, however, may have a breed predisposition: Hart et al (2014) found that CLD risk increased in Golden Retrievers who were gonadectomized between the ages 6 and 11 months, but the risk for Labrador Retrievers did not increase when undergoing gonadectomy at the same age.

In a study of 759 client-owned Golden Retrievers, Torres et al (2013) looked at the effects of spay/neuter on joint disorders and cancer. The authors state, “An important point to make is that the results of this study, being breed-specific, with regard to the effects of early and late neutering, cannot be extrapolated to other breeds, or dogs in general.”

It is well documented that both testosterone and estrogen play an important role in the growth and maturation of bones. A decrease in bone density in spayed Beagles has been described in one study, but these results have yet to be reproduced in subsequent studies.

One heightened concern is whether gonadectomy affects the closure of growth plates (physes). Salmeri et al (1991) found that overall growth rates appear to be unaffected by spay/neuter, although prepubertal gonadectomy has been associated with delayed closure, resulting in lengthening of associated limb bones. While this can be statistically relevant, it is not readily visible or determined to be clinically relevant.

The age at which growth plates close is dependent on breed, genetic factors and disorders, physiological conditions, disease, and nutritional conditions (unbalanced or

STUDY CONSIDERATIONS

When you read any study (or read *about* any study) that presents information about the benefits or hazards of spay/neuter, it's important to try to identify and keep the limitations of the study firmly in mind. Not all study conclusions will be relevant to *all* dogs.

Most of the research conducted on the health effects of spay/neuter is retrospective; researchers examine past and present medical records for a given population of dogs and look for patterns and trends in order to develop hypotheses. These retrospective studies can reveal only associations; some may be confounding while others are instructive and meaningful.

It's challenging to evaluate the effects of spay/neuter and the resultant loss of hormones on canine health. The multifactorial nature of many diseases can interfere with definitive determination of causation. In humans, for example, areas of investigation related to cancer development include such factors as age, gender, ethnicity, diet, occupation, and environment, resulting in a complex composite of potential health impacts. Rarely are factors like these taken into account in veterinary studies, but research is beginning to expand to include these considerations.

When considering a study's conclusions, don't forget to evaluate overall incidence rates for diseases that are of concern. If an overall rate is rare or low, and the likelihood is shown by a study to increase with spay/neuter, the overall risk is going to remain rare or low. Kustritz (2007) categorized 11 different canine conditions based on their incidence rates of rare, low, moderate, or high. Those conditions considered high (mammary neoplasia, pyometra, benign prostatic hypertrophy), along with one in the moderate category (testicular tumors), all experienced a decrease in impact when gonadectomized. The conditions rated rare (transitional cell carcinoma), low (prostatic tumors, osteosarcoma, hemangiosarcoma, cruciate ligament disease, hypothyroidism), and moderate (urinary incontinence) have all been shown to increase with spay/neuter, but even with an increase, that risk continues to be small overall.

Biases can affect the value of a research study, even if it is unintentional. *Recall bias* can occur with studies that ask owners to provide information; the accuracy of owners' reports about their dogs can be highly problematic. *Selection bias* occurs when the selection of a group for study does not achieve proper randomization. Many studies are affected by this bias because the datasets are often obtained from records at veterinary teaching/referral hospitals. This leaves out a percentage of dogs from the general population that don't have their diseases brought to veterinary attention (which also skews incidence rates of diseases, as they are not reported). Furthermore, dogs who are treated at these hospitals are apt to be from upper- and middle-income owners and tend to have conditions that are treatable to some extent.

Finally, often studies only include one breed of dog, resulting in a *breed bias*; studies of this type cannot be extrapolated to all breeds, but they sometimes provide useful information.

incomplete diets can result in growth abnormalities). Certain categories of breeds, such as working, herding, and sporting breeds, show greater susceptibility to orthopedic disorders in general; specifically dogs having large stature or great substance are at a greater risk for hip and elbow dysplasia (Oberbauer et al, 2019).

Spain et al (2004) found no specific correlation between age at spay/neuter and incidence rates of arthritis or long bone fractures, including physeal fractures. This retrospective study at the Erie County (New York) SPCA looked at 1,842 dogs who underwent spay or neuter surgery between 6 weeks and 12 months of age. Dogs who had the procedure before 5.5 months of age were found to have a higher incidence (6.7%) of hip dysplasia and were diagnosed at an earlier age when compared to dogs undergoing the procedure at the age of 5.5 months or older (4.7%).

However, those dogs who had spay/neuter surgery when they were older than 5.5 months were three times more likely to be euthanized due to hip dysplasia than those who had surgery when they were younger. This suggests that early gonadectomy may be associated with a less severe form of HD.

Estrogen has a number of metabolic functions and its effect on muscle, tendons, and ligaments has become the focus of more research. Chidi-Ogbolu and Baar (2019) found that, while estrogen improves muscle mass and strength and increases the collagen content of connective tissues, it decreases stiffness in tendons and ligaments, which can directly affect performance and injury rates. (Risk of cranial cruciate ligament [CCL] injury appears to increase with spay/neuter across the general dog population as well as in the individual breeds studied.)

Kustritz (2007) did not find any studies at that time that would implicate changes in physeal closure with subsequent asynchrony of long bone growth and abnormalities in joint formation as a cause of CCL rupture in dogs.

■ Behavior

Behavior is the result of a complex interaction between genetics and environment. It has been noted that spay/neuter can mitigate some behaviors – and that’s about as far as the data can take you. The few effects that have been studied and found to be statistically relevant have generally been positive.

Studies generally report that spay/neuter reduces libido and decreases the associated reproductive behaviors. Spayed females tend not to engage in any of the behaviors associated with estrus and therefore do not seek out breeding opportunities.

Neutered males tend to show a decrease in roaming, intermale aggression, mounting, and urine-marking behaviors. There is consistent evidence that the frequency of urine marking does *not* depend on the age at gonadectomy.

Kustritz (2007) reported that neither reproductive status nor age at the time of spay/neuter has been found to affect the trainability of working dogs.

According to Duffy and Serpell (2006), behavioral changes are difficult to measure; the parameters with which they are measured are too subjective. Breed, sex, and individual differences need to be considered when examining the manifestation of behavioral changes following spay/neuter. As a result, there is not a clear consensus on what the real effects are.

Furthermore, “interpretation of the literature related to behavioral changes is further complicated by various definitions of aggression” (Houlihan, 2017); as a result, evidence for the influence of gonadectomy on aggressive behavior is inconsistent and sometimes contradictory.

Kustritz (2007) reported that several studies showed an increase among female dogs of heightened reactivity toward humans following spay. It is hypothesized that this may be due to a decrease in estrogen and oxytocin levels. Additionally, testosterone has been shown to increase confidence; this may be useful for timid dogs, but may not be for overconfident ones.

■ Reproductive System

Spay surgery has been shown to have a beneficial effect on life-limiting diseases in female dogs. It not only eliminates the risk of pyometra and uterine and ovarian cancers, but also reduces the risk of mammary cancer.

Research into the influence of spaying on mammary cancer has been extensive. Dorn et al (1968) found that there is strong evidence that ovarian hormones are essential for the development of most cases of mammary cancer, so removal of the ovaries decreases this risk. Subsequent studies have continued to support the protective effect of early spay.

The greatest benefit occurs if spay takes place before the first estrus; the reported rates are .05% if before estrus, 8% if performed after the first estrus, increasing to 26% after second estrus cycle (Schneider et al, 1969). Mammary cancer rates increase greatly with age in dogs. Purebred dogs have been shown to have two times the rate of mammary cancer when compared to mixed-breed dogs of the same age. The incidence rate of mammary neoplasia is estimated to be about 3.4%, with about 50% being benign fibroadenomas and 50% malignant adenocarcinomas.

Castration eradicates the risk of testicular cancer (as the testes are removed) in males. Castration also reduces the risk of age-related prostate issues, benign prostatic hyperplasia (common but not generally life-limiting), and perianal adenomas.

Several studies that show testicular neoplasia is common in older (mean age of 10 years) intact male dogs; however, metastasis is uncommon and castration at time of diagnosis is curative. Benign prostatic hypertrophy is also common in intact male dogs (63.4% in one study). It tends to manifest in 50% of dogs aged 2-3 years, and in 75-80% by age 6. Castration results in a decrease in prostate size resulting in a reduction of clinical signs (Kustritz, 2007).

■ Cancer

The literature review by Urfer and Kaerberlein (2019) reports that there

are many studies that provide evidence for an increase in risk for cancer in dogs of both sexes that have undergone gonadectomy. Smith (2014) summarized that male dogs were at an increased risk after castration for developing cardiac tumors, osteosarcoma, prostatic tumors, transitional cell carcinoma, and lymphoma, while the risk decreased for testicular cancer.

In female dogs, there was an increased risk post-spay of cardiac tumors, cardiac and splenic hemangiosarcoma, osteosarcoma, mast cell tumors, and lymphoma, while the risk decreased for ovarian, uterine, and mammary cancers.

Many of the studies did not take age into account – which is arguably the most important factor for tumor development. However, when the studies did take age into account, increased age was found to be a higher risk factor than spay/neuter.

It's been said that cancer is, ultimately, the result of failed immune surveillance. It is suspected, but not yet proven, that cancer-hunting immune cells depend to some extent on signals from the sex hormones to perform this surveillance. Researchers have speculated that the cancer-hunting immune cells may be less effective at this task in gonadectomized dogs due to the lack of hormonal signalling.

In the breed-specific retrospective study by Kent et al (2018), the timing of spay/neuter was not available for most of the Golden Retrievers. While the study assessed cancer as a cause of death, the association of hormonal exposure on lifespan or the risk of death by cancer couldn't be evaluated, nor was it part of the evaluation for the risk of cancer development. Given that Golden Retrievers are known to be at a high risk for cancer, these results cannot be extrapolated to other breeds.

The study by Cooley et al (2002) found that Rottweilers of both sexes who had undergone

early spay/neuter had higher risks for bone sarcoma (1 in 4) when compared to Rottweilers who were intact throughout their lifetime. However, the study acknowledges that it is not known how hormones affect the development of osteosarcoma. Makielski et al (2019) published a comparative review of osteosarcoma risk factors in dogs and humans and included this commentary on trending current hormonal studies:

“... associations between reproductive status and development of osteosarcoma have been inconsistent. Although several reports suggest that spayed and/or neutered dogs have higher incidence of certain cancers, including osteosarcoma, the relationship between reproductive status and cancer risk may be confounded by other variables, such as the documented tendency toward increased adiposity and body condition in gonadectomized dogs.”

■ Obesity

In dogs, obesity is influenced by diet, breed, activity level, and age, but spay/neuter has also been reported to be a common predisposing risk factor for increased body weight. There is conflicting information as to whether gonadectomy alters metabolism (Reichler, 2009). It is speculated that gonadectomized dogs in general have lower metabolic rates (it has been estimated that they may require as much as 30% fewer calories) and tend to gain weight more than intact dogs, however, the cause and effect relationship is not well defined.

Spain et al (2004) conducted a

population study that indicated that gonadectomy of dogs before 6 months of age is associated with a lower prevalence of obesity when compared to those undergoing gonadectomy after 6 months of age.

In 2019, Bjørnvad et al published a study of dog- and owner-related risk factors for obesity in Danish companion dogs. The research found castrated male dogs were at increased risk for obesity; it is suspected that this may be due to a reduction in testosterone and a subsequent lowering of basal metabolic rate. Female dogs were found to be at risk regardless of reproductive status. They also found that there was a complex association between the owner's weight, the dog's weight, and feeding habits.

■ Urinary System

Studies place the incidence of urinary incontinence in spayed female dogs at 4% to 20%, compared to a rate of 0.4% to 8% for intact females. Spayed dogs may develop incontinence within days of surgery or more commonly years later; it is typically controlled with treatment. Large and giant breeds appear to have a higher risk. Other factors that may contribute to the condition and need further evaluation are urethral length, resting position of the urinary bladder, breed, thyroid level, allergies, and level of obesity.

Studies are contradictory when it comes to determining a correlation between age at time of spay and the likelihood of developing incontinence. Spain et al (2004) and Thrusfield et al (1998) reported an increase in urinary incontinence in females who were spayed at an early age, yet other studies have failed to support this conclusion. More research is required, but in those studies that *did* find a correlation, it was associated only with pediatric (6-12 weeks) gonadectomy. Females spayed at an early age have also been reported to have had a slightly higher incidence of bladder infections, but these infections were easily treated and did not become chronic.



Dogs who have been spayed or neutered often have lower metabolic rates and may be predisposed to obesity.

It has been theorized that it is the lack of estrogen that causes incontinence in spayed females, but this is controversial and not fully supported by research. Increased rates of incontinence are not reported in pregnant females even though they have extremely low estrogen levels during pregnancy.

Palm and Reichler (2012) report that incontinence in spayed dogs has been successfully treated with use of gonadotropin-releasing hormone (GNRH) superagonist implants. The implants work by suppressing the release of gonadotropins.

In contrast, surgical gonadectomy *increases* the release of gonadotropins. This suggests that an increased risk for incontinence is not caused by the lack of sex hormones, but rather by the increased levels of gonadotropins induced by removal of the ovaries.

Male dogs who have been castrated prepubertally tend to have a smaller penis and prepuce, but their urethral diameter and function are the same as dogs neutered later and no clinical significance or condition has been associated with this difference (Salmeri et al, 1991).

■ Immune System

Findings from Sundberg et al (2016) suggest that spay/neuter is associated with an increased risk for certain autoimmune disorders. Six of the 11 immune diseases evaluated (atopic dermatitis, autoimmune hemolytic anemia, Addison's disease, hypothyroidism, immune-mediated thrombocytopenia, and inflammatory bowel disease) showed an increased prevalence in gonadectomized dogs.

The study notes that even though the dataset included more than 90,000 dogs and expression of the diseases were statistically relevant, the actual incidence rate was not high and it declined over the 15-year evaluation.

Given that this was a retrospective study limited to dogs seen at a referral veterinary hospital, it may not reflect incidence rates within the population at large but rather may be biased to complex or more severe cases.

■ Cognitive Function

There has been limited research conducted on the risk that cognitive function may be altered as a result of spay/neuter. A comparison of the progression of cognitive dysfunction in intact and castrated male dogs was performed in the Hart study (2001) with a small sample size (6 dogs); it revealed a slowing of progression in the intact dogs.

In contrast, a 2000 study by Waters et al found that intact Beagles showed DNA damage to the neurons in the brain when compared to castrated Beagles (again, sample size was small, with only four dogs in each group). This is an area of research that is just beginning to be explored. Much more research is needed to understand the processes that influence cognitive function and how they may be changed by spay/neuter.

■ Anesthesia

Statistically, puppies are less likely to die under anesthesia and recover faster from gonadectomy than their adult counterparts. Complications arising from the procedure are uncommon and the rates are consistent across ages.

WHAT (AND HOW) SHOULD YOU DECIDE?

Even a minimal survey of the research regarding the effects of spay/neuter reveals that the situation is extremely complex and, at times, ambiguous. There is evidence to support correlations for both beneficial and adverse effects, but even more important is that it demonstrates how much we still don't understand about reproductive hormones and the consequences of spay/neuter.

When the time comes for you to make spay/neuter decisions for a dog that you do not want to reproduce, remember: There is no single course of action that is "best" for all dogs and all owners, and don't let *anyone* make you feel bad for your decision, whatever it is – that is, as long as it doesn't end with an accidental breeding and unwanted puppies.

Here's the one time that we feel

it makes the most sense for an owner to give more weight to published research than their own preferences: when the person owns a purebred dog of a breed that has been the subject of large, well-respected studies of the effects of spay/neuter on dogs of that specific breed, and the study found clear and significant statistical advantages to a certain course of action. In that case, we would strongly recommend reading the conclusion of those studies and discussing them with your veterinarian. Oberbauer et al (2019) determined that many canine health disorders reflect the dogs' genetic heritage. Within breeds, there may be shared genetic susceptibility that increases risk for certain diseases within breeds and this risk may be enhanced with neutering.

However, you have to take single-breed studies with a grain of salt if your dog does *not* share any of the subject breed's genes. Some of these studies are widely cited by people who think the studies should inform the decisions of *all* dog owners, but the findings often are contradicted when applied to another breed.

Some people strongly believe that it's unethical to spay or neuter dogs, because the procedure irretrievably alters the dog's physiology and might cause an adverse side effect, perhaps years in the future. As we have described, however, intact dogs are *also* prone to adverse health conditions; there simply isn't a choice that doesn't have consequences!

OWN YOUR DECISION – AND RESPECT OTHERS

As we've stated elsewhere in this article, it has become sort of politically correct today to maintain a dog in his or her intact state. But this isn't something that everyone can manage in a responsible fashion! If there is a single weak link in a household, whether it's a forgetful child, a distracted adult, or a less-than-super-secure fence, accidents can and will happen.

We know owners who swear their female dogs never left their sides and had zero contact with another dog, and yet – poof, a virgin pregnancy?

Doubtful, and irresponsible, too.

And while some people will try to make you feel bad about it, it's okay to admit that you do not enjoy living with an intact dog of either sex! If you have grown up in a time and place where literally all the dogs you've ever known were neutered, you might be quite alarmed at the personality change exhibited by your female dog when she comes into heat. You may not feel comfortable with some of the more strongly masculine attributes of an intact male dog, which may include more competitive urine-marking, humping, or overzealous sexual interest in female dogs.

Also, there are many people who are strongly committed to adopting only from shelters or rescue organizations, where spay/neuter is not only mandated but might also have been performed on very young puppies. Not only is prepubertal gonadectomy an important tool against pet overpopulation, it is likely to improve the odds that dogs will be retained by their owners. Studies have found that intact dogs are more likely to be relinquished than those that have undergone spay or neuter.

For intact dogs with homes, veterinarians and owners are challenged with making the best decision for that specific dog. An informed decision requires an evaluation reflective of our dogs and our risk tolerances. Every dog is an individual, including how they respond to gonadectomy or remaining intact. We always recommend consulting with your veterinarian to determine the best strategy for your dog based on age, body condition, breed, genetics, lifestyle, behavior, temperament, and reproduction management – and then taking responsibility for your choice. 🐾

Barbara Dobbins, a former dog trainer, writes about dogs and studies canine ethology. She lives in the San Francisco Bay area with her dogs, Tico and Parker.

Doing what you think is right



Parker, handsome and sound at two.

In 2018, my five-month-old, intact Border Collie began to display an abnormal outward turn to his left front leg. Parker's orthopedic surgeon diagnosed him with an early closure of the ulnar growth plate, probably as a result of injury. The ulna ceased growing while the radius continued to lengthen. The radius began to bow as it was restricted by the nongrowing ulna, resulting in the outward splay of the leg. Ultimately, his leg was repaired within a few degrees of normal through a series of surgeries as he grew.

Knowing that my young pup faced multiple surgeries, I did not want to have to put him through an additional anesthetic for neuter surgery within the next year and opted to have his gonadectomy done during one of his orthopedic procedures.

Some friends questioned my decision when they heard that I was going to have my young dog neutered, citing unnamed "studies" alleging that early spay/neuter can have a disastrous effect on the bones and growth plates. I researched all the studies I could find – and concluded that they were limited in scope. But I *also* consulted with his orthopedic surgeon (one who treats a great number of canine athletes). He related that he had not seen any negative effect of early spay/neuter in the animals he treated. I was aware that this was anecdotal evidence, but if the person working on the bones of agility dogs wasn't seeing anything he could relate to early spay/neuter, that was good enough for me.



Photo by Irene Aborn

Parker's intact male littermate, Hero.

Two years later my boy is happy, healthy, and active with no residual orthopedic concerns. His appearance is similar to his dad (intact), mom (recently spayed), and sister (intact) from another litter, but not so much like one of his intact male littermates. Is this a result of the lack of testosterone? Or due to his own individual genetic structure and environment? Did neutering him "early" (at 6 months of age) predispose him to cancer and other health concerns? While I may wonder about these issues, I am confident that I made the best decision I could for me and my dog at that time.



Photo by Pamela Johnson

Parker's dam, Honey, was recently spayed.



Photo by Irene Aborn

Parker's sire, Flash, was intact throughout his lifetime.

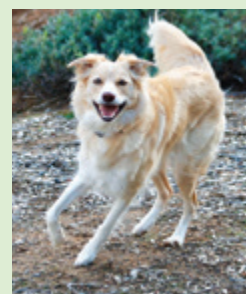


Photo by Pamela Johnson

Parker most resembles his intact full sister, Wynnie.

SPAY/NEUTER STUDY REFERENCES

If you've gotten this far, we applaud you! It's a lot of information! But if you want to delve even more deeply into the research on the possible health effects of spay/neuter, this list is a great resource. It's impossible to mention every study on the subject, but this list includes all the studies referenced in the foregoing article as well as other frequently cited works.

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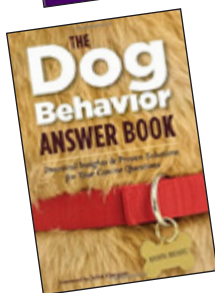
Great Books Specially Selected by Whole Dog Journal



Fight! A Practical Guide to the Treatment of Dog-Dog Aggression
by Jean Donaldson

This down-to-earth manual will teach you how to use behavior modification to retrain a dog who bullies other dogs, or becomes fearful when approached by other dogs. Contents include common types of aggression, assessing prognosis, remedial socialization, on-leash manners training, proximity sensitivity, play style and skills, resource guarding and prevention!

Paperback - 116 Pages, \$12.95



The Dog Behavior Answer Book
by Arden Moore

This delightful and informative book will help you discover the well-behaved pet inside every dog. Nationally known dog expert Arden Moore answers questions about canine quirks, baffling habits, and destructive behavior. Moore provides answers that clearly explain canine actions and reactions, and then helps readers with suggestions for modifying unacceptable behavior. For every canine misdeed, there is a human counter-response to fix the problem. Read about both sides of the story in these friendly questions and answers, taken from real-life situations with real dogs. A great read even if your dog is perfect!

Paperback - 336 Pages, \$14.95



Beware of the Dog
by Pat Miller, CBCC-KA, CDDT-KA

Frustrated with aggression in your dog? Looking for ways to prevent such behavior? Time to move on from dominance theory, alpha rolls, punishment and other outdated practices. Acclaimed dog trainer Pat Miller shares up-to-date, dog-friendly methods to manage and modify aggressive behavior as well as ways to prevent it altogether. Filled with step-by-step instructions and advice to help your dog in stressful situations, **Beware of the Dog** will guide you through behavior modification plans along with ways to avoid common stressors altogether. You'll learn why dogs act aggressively, ways to recognize the important warning signs of aggression, the value of basic puppy training and socialization and positive training techniques to prevent fights and bites.

Paperback - 208 Pages, \$19.95



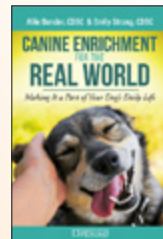
Don't Leave Me!
by Nicole Wilde

Separation anxiety can be an extremely challenging behavior issue for dogs and owners alike. Topics include the role of management, nutrition, and exercise; whether pharmacological intervention could help; how to build canine confidence; creative management solutions; step-by-step behavior modification protocols; alternative therapies that can be invaluable; and how to put it all together in a customized plan.

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Featured Book

Canine Enrichment
by Allie Bender, CDBC & Emily Strong, CDBC



In the world of dogs, there is now more awareness than ever of the need to provide enrichment, especially in shelters. But what exactly is enrichment? The concept is pretty straightforward: learn what your dog's needs are, and then structure an environment and routine that allows them to engage in behaviors they find enriching. To truly enrich your dog's life, you should offer them opportunities to engage in natural or instinctual behaviors. Aside from the limitations we have to place on a dog in today's modern, busy world, the biggest constraint to enriching your dog's life is your imagination!

Paperback - 236 Pages, \$19.95

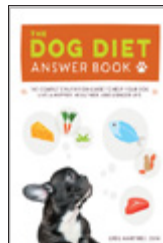
Remember Me
by Eileen Anderson



An award-winning guidebook for owners of dogs who are losing their mental faculties as they age. Learn about the symptoms of canine cognitive dysfunction, medications and other interventions that are showing promise in treating the condition; how to adapt your home and habits to keep your dog safe; products available to solve the problems of senior dogs and much more!

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The Dog Diet Answer Book
by Greg Martinez, DVM



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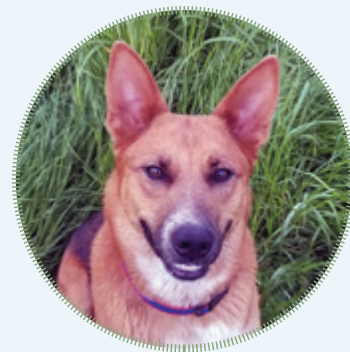
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