



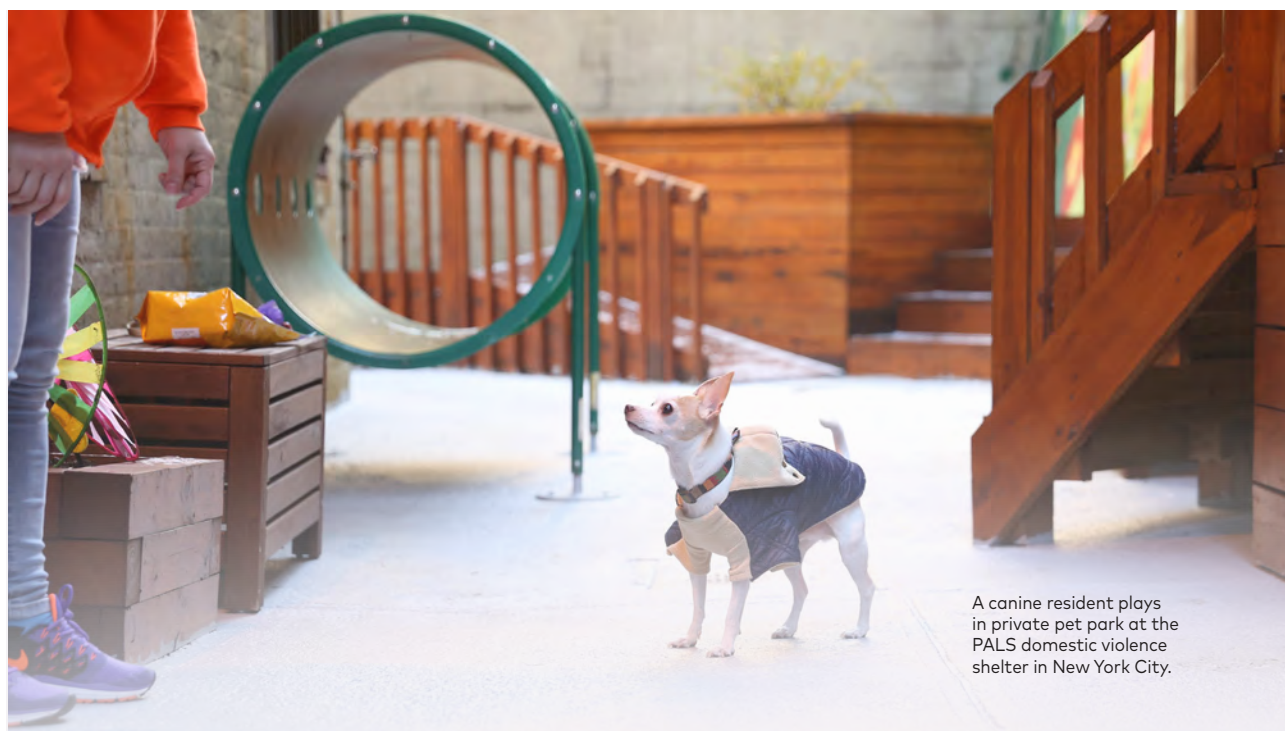
Exploring evidence for CBD in pets

Forget the legal issues—does cannabidiol actually work in veterinary patients? Experts share their experience and expertise. *By Carla Johnson, DVM*

Veterinarians are being bombarded these days by questions, requests, lofty claims, unrealistic expectations and patchy scientific information about cannabidiol (CBD) products for pets. Public demand is outpacing the research as clients increasingly gain access to these products and, on the advice of a neighbor or internet article, begin using them on Max and Maizy. It's a bit of a free-for-all.

Scientific input from reliable sources is simultaneously vague and overwhelming, largely because this is uncharted territory. Researchers are still investigating the endocannabinoid and phytocannabinoid systems in people and animals, along with the phytopharmacology of the cannabinoids

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A canine resident plays in private pet park at the PALS domestic violence shelter in New York City.

A refuge from violence—for pets and people

As more domestic violence shelters add pet accommodations, victims who might have remained in an abusive situation are seeking help. But there is more work to be done. *By Erica Tricarico*

The bond between people and pets is stronger than ever, and evidence of this powerful connection is perhaps no clearer than in cases of domestic violence. According to the Rose Brooks Center, Missouri's largest single-site, comprehensive domestic shelter facility, nearly half all domestic violence victims in the U.S. remain in abusive relationships because they fear what may happen to their pets if they're left behind—often risking their own

security to keep their animal companions safe.

An estimated 71% of domestic violence survivors report that their abuser has injured, maimed or threatened their family pet, according to the National Coalition Against Domestic Violence. Studies also show that 55% of domestic violence victims and their children report that their pets are an important source of emotional support, underscoring the need to accommodate pets as well as people at shelters.

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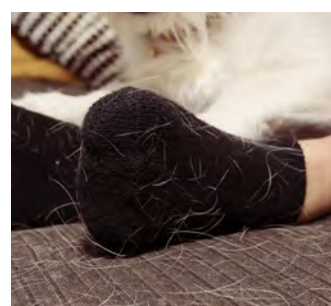
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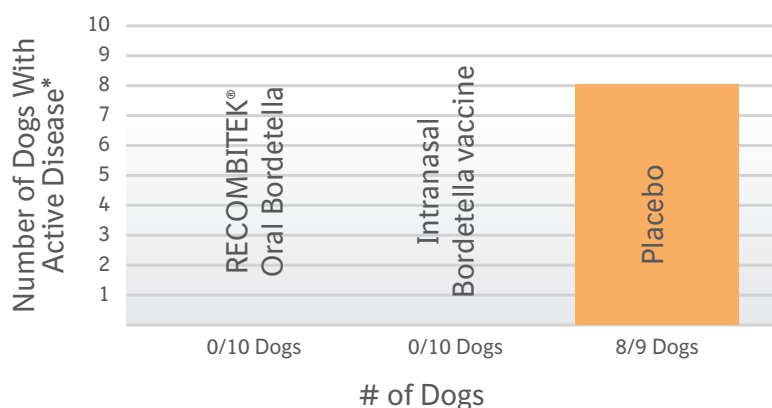
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chall@mjhlifesciences.com
News Channel Director | **Kristi Reimer Fender**
kfender@mmhgroup.com
Associate Editorial Director | **Maureen McKinney**
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(913) 871-3917 | ahomann@mmhgroup.com
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Congratulations to our Practice Manager of the Year

Like their veterinarian, technician and receptionist colleagues, the nation's veterinary practice managers are often too humble to think of themselves as Practice Manager of the Year. So since 2014, dvm360 and the Veterinary Hospital Managers Association (VHMA) have collaborated to help them get the respect and accolades they deserve in the dvm360/VHMA Practice Manager of the Year award. The best part? Sharing their knowledge and experience with the rest of the profession.

This year's winner, Jessica Molina, PHR, CVP, CCFP, hospital administrator at Lee Veterinary in Atmore, Alabama, impressed the judges with her experience from hiring associate veterinarians and empowering veterinary team leaders, to inspiring her employees with a different take on superheroes in the workplace (see more on page 6). Congratulations to Molina!

Here's how the process works. First, a veterinary professional nominates a great practice manager they know. Then dvm360 contacts the nominee to ask them to enter

and tell us about a few instances that prove their skills. Specifically, we ask them to answer questions on their experiences in leadership, decision-making, team motivation and management, and adapting to change. From these answers 10 finalists are selected, from which one final winner is chosen.

The contest gives the nation's veterinary professionals a chance to highlight the amazing work practice managers do every day in hospitals across the country. Prizes focus on sharing the winner's knowledge and plugging them into a network of colleagues to learn with. The Practice Manager of the Year wins complimentary registration to an upcoming Fetch dvm360 conference as well as registration, travel and lodging for attendance at two premier events from the VHMA: the annual Management Exchange and the annual VHMA Conference.

The new Practice Manager of the Year also offers guidance to the dvm360.com, dvm360 magazine, Firstline and Vetted teams on future content and future ways to help the veterinary profession and highlight

the increasingly valuable job of veterinary practice manager.

The Practice Manager of the Year, as well as the finalists selected, are "enhancing the image of the profession," says Jim Nash, MHA, CVP, former president of the VHMA. "They're helping their practices thrive by demonstrating best practices and outstanding problem-solving skills. These managers are ushering in positive changes and deserve to be applauded for their hard work, persistence and professionalism."

The association's executive director, Christine Shupe, CAE, agrees: "The VHMA is proud to collaborate with dvm360 to identify and recognize the movers and shakers in the field of veterinary practice management. The narratives presented by each finalist reinforce the pivotal role a manager plays in a practice's success."

We at dvm360 offer sincere congratulations to this year's winner and a Happy New Year to all veterinary teams as they kick off a fantastic 2020!

—Mike Hennessy Sr., Chairman



Fetch speaker says new managers should do these three things on their first day

Transitioning to a manager role for the first time with your veterinary team—or maybe the first time ever—can be tough. In a Fetch dvm360 San Diego session packed with tips, Ori Scislowicz, LVT, PHR, SHRM-SCRP, offered three key things to establish on day one:

1. Remember how things have changed for you. An amazing veterinarian, technician or other team member accomplishes tasks well. An amazing manager helps other people accomplish tasks well. Your new job is less about your to-do list and more about facilitating others' to-do lists. "Keep in mind your demeanor and your

work style," Scislowicz said. When she started, she said she moved fast and frantically, and it rubbed off on her new team, making everyone feel "chaotic." She slowed down and focused on them and got positive feedback.

2. Establish an open-door policy and regular check-ins. Be available to your team, and regularly explore their goals, challenges and needs. "You can open your door, but that doesn't mean people will talk," said Scislowicz. "You need to be having regular conversations. Don't just be in your office stuck in there. You need to be walking around. You need to be approachable." While you're walking

around, you're not nitpicking—you're chatting and make sure people see dialogue is open with you.

3. Model good behavior. That means no gossiping, no complaining, and sticking to your word.

Last but not least: "One thing that really upsets me is new managers who come in, and they don't assume good intentions," Scislowicz said. These newbies default to a hard-nosed skepticism and think everyone is out to take advantage. Start assuming the best of your team, and you'll build trust. Lose that, and it's over: "Team members blow off leaders when they can't trust them." **dvm360**



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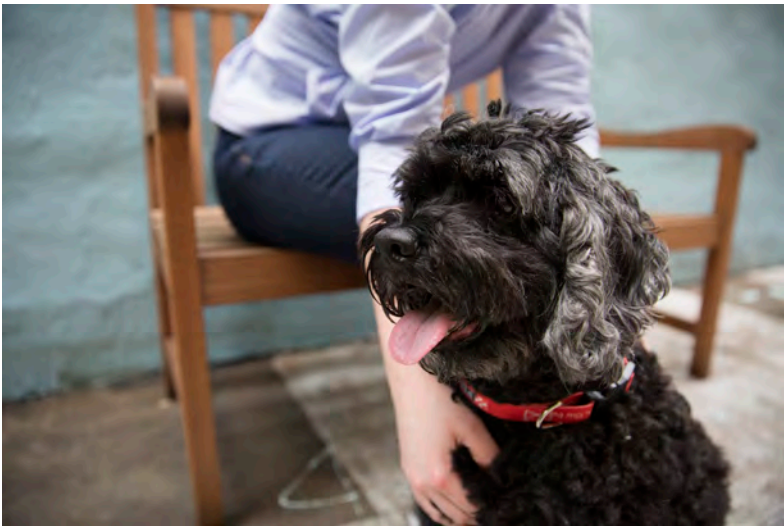
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(See Contraindications, Warnings, Human Warnings, and Adverse Reactions for more information.)

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Some dogs are more sensitive to avermectins due to a mutation in the MDR1 gene. Dogs with this mutation may develop signs of severe avermectin toxicity if they ingest this product. The most common breeds associated with this mutation include Collies and Collie crosses.

^b Although there is no specific antagonist for avermectin toxicity, even severely affected dogs have completely recovered from avermectin toxicity with intensive veterinary supportive care.

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Causes eye irritation. Harmful if swallowed. Do not get in eyes or on clothing. Avoid contact with skin.

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ADVERSE REACTIONS: Heartworm Negative Dogs: The most common adverse reactions observed during field studies were pruritus, residue, medicinal odor, lethargy, inappetence and hyperactivity.

Heartworm Positive Dogs: The most common adverse reactions observed during field studies were cough, lethargy, vomiting, diarrhea (including hemorrhagic), and inappetence. **Cats:** The most common adverse reactions observed during field studies were lethargy, behavioral changes, discomfort, hypersalivation, polydipsia and coughing and gagging. **Ferrets:** The most common adverse reactions observed during field studies were pruritus/scratching, scabbing, redness, wounds and inflammation at the treatment site; lethargy; and chemical odor.

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NEWS | Veterinary business

2019 Practice Manager of the Year: **Jessica Molina**

This veterinary hospital administrator impressed judges from dvm360 and the VHMA with her approach to team unity and change in the veterinary industry.

By Brendan Howard

Jessica Molina, PHR, CVPM, CCFP, hospital administrator at Lee Veterinary Clinic in Atmore, Alabama, has been named 2019 Practice Manager of the Year by dvm360 and the Veterinary Hospital Managers Association (VHMA). Molina wowed two rounds of judges with answers that showed leadership and decision-making, team motivation and management skills, a dedication to lifelong learning, and a demonstrated ability to adapt to change.

Her work has run the gamut—from hiring associate veterinarians and empowering team leaders, to inspiring her employees with a different take on superheroes in the workplace. Molina says she hopes the win will give her even more opportunities to share with colleagues the insights she’s gained from her mentor and her own team members.

"I also hope that winning this award will inspire more individuals who are looking for a career in veterinary medicine to recognize and consider the path of veterinary practice management," Molina says. "Most of all, winning this award will not only push me to continue learning but to continue to grow. As I say (and firmly believe), you cannot get complacent—after all, today's great is tomorrow's subpar."

"I've always had a passion for animals, but people and numbers have always excited me more," she continues. "The more challenging, the better! It's the 'aha' moments that come out of both that are my favorite part of being a veterinary practice manager. Both relationships and numbers provide key insight into the practice's overall health."

The VHMA and dvm360 have co-organized the dvm360/VHMA Practice Manager of the Year contest since 2014. Christine Shupe, VHMA executive director, says she looks forward to Molina's contributions in the coming year.

“We are excited that Jessica is the 2019 Practice Manager of the Year,” Shupe says. “Her performance demonstrates that she has effectively transitioned from being a competent manager to a successful leader ... and is committed to personal and professional growth, empowering her staff and effectively addressing the challenges and changes that confront practice managers.”

The new VHMA president, Michelle Gonzales-Bryant, CVPM, says Molina is a great person to carry the torch for the award, which is about “giving managers a platform to spread ideas that work.”

“Jessica’s track record shows that she is innovative and thoughtful about the issues that managers address personally, with their teams and in the practices,” Gonzales-Bryant says. “She has been remarkably successful, and I am confident that she will have much to offer her colleagues and the industry over the next year.”

Molina's prizes for winning include free registration to a Fetch dvm360 conference as well as registration and travel expenses to attend two VHMA events in the coming year. [dvm360](#)



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Abyssinian cats are more prone to develop FIP than other breeds.



Feline infectious peritonitis: From fatal to treatable

Top feline researchers and clinicians at a recent Winn Feline Foundation symposium say the disease should lose its lethal label. *By Sarah Mouton Dowdy*

Feline infectious peritonitis (FIP) has long carried a fatal designation, but according to top feline researchers and clinicians at the Winn Feline Foundation's recent FIP symposium at the University of California-Davis (aptly titled "PURRsuing FIP and WINning"), the disease should lose its lethal label.

Niels Pedersen, DVM, PhD, professor emeritus at the UC Davis School of Veterinary Medicine, opened a roundtable discussion Nov. 16, 2019 on the topic of treatment options by explaining the two basic approaches to treating FIP: You can either stimulate the host's immune system to get rid of

the virus, or you can attack the virus itself. The latter approach consists of both nonspecific and specific antivirals. Nonspecific antivirals include common drugs such as itraconazole, an antifungal with antiviral properties.

The problem with these drugs, says Dr. Pedersen, is that you must administer toxic amounts in order to get enough antiviral activity to inhibit the virus. In other words, you damage the host cat's cells along with the virus. Specific antivirals, on the other hand, hold more promise for the future of FIP treatment.

The lowdown on high hopes for specific antivirals

According to Dr. Pedersen, specific antivirals are small, easily absorbed molecules that target viral proteins without causing significant harm to the host's cells. Two of these specific antiviral compounds, GC376 and GS-441524, have shown efficacy in treating FIP, though neither drug has yet been granted FDA approval.

The rights for GC376, Dr. Pedersen briefly explained, were acquired by Anivive Lifesciences, which has begun the lengthy process of obtaining FDA approval for the treatment of cats with FIP. He noted that while he does think it's a promising drug, it's not without some problems (as evidenced by his 2018 research findings).¹ >>

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The future of GS-441524 is a bit more complicated. Dr. Pedersen explained that he used worked for Gilead Sciences around the time the company was founded and that while working on the human immunodeficiency virus (HIV) and simian immunodeficiency virus (SIV), he noticed that Gilead would make several iterations of the same drug compound. So more recently, after some promising experiences with GC376 and hearing that Gilead was working on a drug for the potential treatment of Ebola (an RNA virus and a distant relative of the coronavirus), Dr. Pedersen reached out to Gilead to see if he could gain access to the drug and its iterations.

It took a year to sort out all of the details, but Dr. Pedersen eventually got the compounds, screened them, and landed on GS-441524. He and his colleagues performed pharmacokinetic studies and researched the compound's efficacy and safety against experimental FIP, finding it to be highly efficacious.² They also published promising results from a field trial.³

“And basically,” explained Dr. Pedersen, “all through this process we were led to believe that if there was something of importance to animals, there would be a chance to be granted animal rights—maybe not to us, but to somebody else.”

After the field trial, Dr. Pedersen put the ball in Gilead's court: “At that point we said, ‘Where's this going? We haven't had a firm agreement with you regarding animal rights.’”

Gilead came back with some disappointing news. “They let us know that

we (or anyone else) wouldn't be granted animal rights for this compound because they'd discovered in the meantime that the compound was looking very promising for their Ebola research—the same compound in a somewhat different form,” Dr. Pedersen explained. “They were worried something would happen in the animal development side that would affect their ability to get the human form FDA approval. ... Anything you find in any animal species has to be reported to the FDA, so if we were to find something bad in cats, it could completely poison the human side of it.”

Anything you can do, I can do on the black market

While he understood Gilead's stance, Dr. Pedersen did warn the company that if it continued to sit on GS-441524, someone else would take it and manufacture it for the black market. “And that's exactly what's happened,” he said. “Savvy people have been able to synthesize the compound themselves—all formulas have to be published, so this is all known.” The same has happened with GC376.

Dr. Pedersen noted that most of these savvy manufacturers are located in Asia and that cat owner groups are acting as intermediaries between manufacturers and desperate pet owners.

“I don't recommend people buy drugs from these sources, but I can't stop them either,” he explained. “It's an interesting situation to be in. The best I can do is encourage people to interact with their

veterinarians—those veterinarians who *will* interact with them. ... There are veterinarians who say they want nothing to do with this whole thing, and that's fair enough. And there are veterinarians who say, ‘Listen. I will work with clients. If they can get the drugs, I will work with them to make sure the cat is properly monitored, that the drug is administered correctly and that the side effects are dealt with.’”

With GC376 and GS-441524, FIP's fatal days are numbered

Despite these obstacles, the overall mood in the room was optimistic. Brian Murphy, DVM, PhD, associate professor of microbiology and immunobiology at the UC Davis School of Veterinary Medicine, summed it up this way: “This is a treatable disease. We will cure this disease. We basically have the cure now. It's a matter of finding the exact right drug and combination and making it available at an affordable price.” **dvm360**

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Sarah Mouton Dowdy, a former associate content specialist for dvm360, is a freelance writer and editor in Kansas City, Missouri.

Resource helps vet schools cope with suicide

When a student dies by suicide, veterinary schools may not have a firm plan in place for how to manage the situation. The teams at the American Foundation for Suicide Prevention, the AVMA and the Association of American Veterinary Medical Colleges hope a new resource will help.

“After a Suicide: A Toolkit for Colleges of Veterinary Medicine” offers a plan of action, tools and other resources. Steps for proactive planning, detailed checklists and suggestions for conducting sensitive conversations are all included. The document also includes details on

the five major steps for a college of veterinary medicine to take after a suicide: getting the facts first, informing the emergency contact person or family, sharing the news, helping students cope and memorialization.

Florida names new interim vet school dean

Leaders at the University of Florida College of Veterinary Medicine have announced that Associate Dean of Clinical Services Dana Zimmer, DVM, is the school's new interim dean.

Dr. Zimmer is a 1995 graduate of the college and joined the university staff in 2002, working first in

extension, then large-animal medicine and later progressing to leadership roles. She became chief of staff of the University of Florida Veterinary Hospitals in 2010 and held that position until her appointment to the associate dean role in 2015.

A release announcing the appointment highlights her work and leadership as patient case-loads have grown at the school's hospitals—from 20,542 patients in 2011 to 41,811 patients in 2019, with another 6,578 animals treated at the school's Pet Emergency Treatment Services clinic in Ocala.

Executive Associate Dean Tom Vickroy, PhD, had been serving as acting dean following the retirement of James Lloyd, DVM, PhD, in May after six years in the job.

PACT Act signed into law

On Nov. 25, after overwhelming support in the House and Senate, the anti-cruelty bill known as the PACT Act became law with President Trump's signature.

The Preventing Animal Cruelty and Torture Act makes it a federal crime for “any person to intentionally engage in animal crushing if the animals or animal crushing is in, substantially affects, or uses a means or facility of, interstate or foreign commerce,” according to a fact sheet about the bill.

The bill expands a 2010 act that made the creation and distribution of “animal crushing” videos illegal but did not criminalize the perpetrators of the cruelty. **dvm360**

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dvm360's top news stories of 2019

Here are the year's most-clicked news and commentaries from dvm360.com and *dvm360* magazine. What did you miss?



#10 ▲ 'DVM needed': A look at the associate veterinarian shortage

A combination of factors has created an environment where there are more veterinary positions than doctors to fill them. Here's some insight from both perspectives—the clinic's and the candidate's: dvm360.com/DVMneeded.



#9 ▲ A dog was euthanized so it could be buried with its owner. You responded en masse

Back in May 2019, CNN ran an article that quickly went viral. When we shared it on the *dvm360* Facebook page, readers had a lot to say: dvm360.com/dogburied.

#8 ► Human surgeons operating on dogs: When good intentions aren't enough

His heart may have been in the right place, but an Atlanta orthopedic surgeon voluntarily shut down his nonprofit organization after backlash from area veterinarians: dvm360.com/humanortho.



#7 ▲ ProHeart 12 approved for use in U.S. veterinary market

Injectable heartworm preventive is approved for dogs 12 months of age and older and provides one year of protection: dvm360.com/proheart12.



#6 ▲ Where have all the nurses gone?

Thoughts on the veterinary nurse shortage from a veteran registered technician: dvm360.com/nurses.



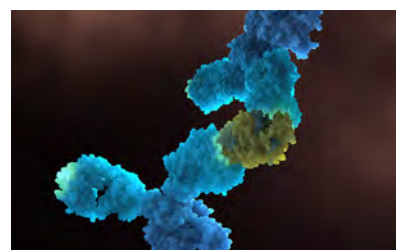
#5 ► FDA issues update on possible tie between grain-free diets and heart disease

Its investigation is ongoing and the agency hasn't changed its recommendation to pet owners whose pets are not ill: dvm360.com/FDAupdate.



#4 ▲ Veterinary student faces fraud charges; allegedly sold rescued horses for slaughter

Tuskegee student Fallon Blackwood was indicted in Alabama and North Carolina; owners she "rescued" horses from said she promised their horses a better life: dvm360.com/rescuefraud.

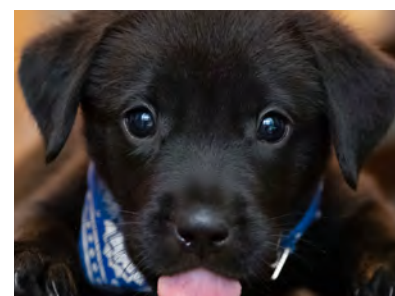


#3 ▲ Purina says it's cracked the (egg) code on feline allergens

News that may save more cats from relinquishment: A diet coated in egg powder has been found to neutralize the protein that causes people to experience allergic reactions to cats: dvm360.com/feld1.

#2 ▼ Reexamining the early spay-neuter paradigm in dogs

Two veterinarians respectfully discuss their disagreements about the medical and societal need for early spays and neuters in America's pets: dvm360.com/reexamining.



#1 ▼ Veterinarians need better boundaries

Asking pet owners, colleagues and the rest of the world to be nice to veterinarians is not going to solve the profession's problems with burnout, mental health and suicide, this commentator argues. It's time to better manage our emotional and conversational boundaries: dvm360.com/betterboundaries.



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Domestic violence
> Continued from cover



A close-up view of the PALS domestic violence shelter's private outdoor pet park.



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A growing need for pet accommodations

More domestic violence shelters that accept pets are cropping up across the U.S., but only 3% to 10% offer pet-friendly accommodations—estimates vary. This leaves many victims facing difficult, heartbreaking and sometimes dangerous decisions. Do they relinquish their pet? Do they stay with their abuser to protect their pet from being injured? Do they live in their car until they find the right shelter?

“Try to picture yourself in that situation—you can get help for yourself and your children, but you’re going to have to leave your pets behind. How hard it would be to leave?” asks Kris Neuhauser, DVM, medical director at Noah’s Ark Animal Clinic in Kansas City, Missouri, which provides veterinary care for pets living at Rose Brooks Center.

“Giving [domestic violence survivors] that opportunity to be able to get help for themselves and their animals without having to leave that animal behind and worrying about what might be happening to their pet is so important,” says Dr. Neuhauser. “That gives [them] support ... through the recovery.”

Not all pet-friendly accommodations are created equal. Some domestic violence shelters partner with local veterinary clinics or animal shelters that agree to put up the animals temporarily, while others work with foster families that will take in victims’ pets. Some shelters have kennels and other storage space set aside for crated animals; others let pets stay in rooms with residents.

Pets as pawns: Survivor stories

Lisa Anderson (not her real name), a 47-year-old domestic violence survivor and mother of four, is all too aware of what can happen to pets in situations of domestic violence: Her abuser killed one of her dogs and she knew that if she didn’t take the other two with her, they were next.

“He killed my dog Jack with a choker chain. I knew that the last two [dogs] would not just be injured; they would be killed,” she says.

One day, Anderson’s husband came home intoxicated, locked their bedroom door, and began to hit and choke her. She yelled for help, and her daughter was able to pick the lock. When her daughter opened the door, Anderson’s husband loosened his grip enough for her to regain consciousness. Her daughter had a look of sheer terror on her face, Anderson recalls. That was it, she thought. It was time to get out.

Anderson left with her two younger children (her older two children are grown) and her two dogs, but finding a domestic violence shelter in New York City that accepted >>

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A look inside one of the PALS Place pet-friendly apartments where owners live privately with their pets.

dogs wasn't easy. "Our husky is my son's service dog, and they still didn't take us," she says.

After living in her car with her dogs and her children for two weeks, Anderson contacted the ASPCA, thinking she would have to relinquish her pets. Instead, she was connected with the Urban Resource Institute (URI) People and Animals Living Safely (PALS) program. PALS is one of the only domestic violence shelter in New York City that offers pet accommodations. The shelter welcomed Anderson, her children and her dogs; it was a brand-new beginning.

When PALS was launched in a pilot capacity in 2013, the shelter only accepted cats. Then the program was expanded to dogs. "We have served 192 families and 260 pets since the program began," says PALS Director Danielle Emery. "We have added a new shelter every year."

In 2019, URI introduced PALS Place, an apartment-style domestic violence shelter designed to be "a safe, secure place for domestic violence victims and their pets to heal together."

According to Emery, PALS Place provides residents' pets with pretty much anything they need to help them thrive in the environment. "Everyone gets a crate, bedding, blankets, litter, scratching post, food," she says. "And we accept any pets that are legal to own, from dogs and cats to birds, guinea pigs, turtles, rabbits and more." The shelter also has a private "pet park" for dogs and cats to enjoy with their owners.

Rose Brooks opened its pet shelter, Paws Place, in 2012. It all started when a woman called the domestic violence hotline after being severely beaten by her boyfriend. At the time, Rose Brooks had a no-pet policy. The woman's dog, a Great Dane, had saved her life by lying on top of her and taking the majority of blows. She refused to leave him behind, and this courageous 110-lb dog became the first pet resident at Paws Place. Many more would soon follow.

"Our mission at Rose Brooks is to break the cycle of domestic violence, and we recognize pets as part of that cycle," says Zoë Agnew-Svoboda, Paws Place program coordinator. "Often pets are used as a tool to maintain power and control in a relationship. By accepting pets, [the center] is accessible to anyone who may need our help. Our goal is for more shelters to provide services for pet owners."

Getting the message out

So how can domestic violence shelters go about adding pet accommodations, especially when they're already under-resourced? Rita Garza, a marketing strategist who helped create the URIPALS program, said in a 2018 JAVMA article that it takes a lot of money and strong partners to make domestic violence shelters pet-friendly.

"Corporate partners are essential, foundation funding is essential, individual donors are essential," Garza says. "The more we build awareness, the more

the communities will support [pet-friendly shelters]. You can piece together resources and be innovative through layers of local, city and state funding, whatever is available."

To help raise awareness about the pressing need for pet accommodations, Rose Brooks provides several free trainings about the connection between animal abuse and domestic violence.

"Shelters that allow pets are filling a gap in services that is often missed. So many of our residents with pets either lived in their cars or stayed in a dangerous situation longer because they couldn't leave their pet behind," says Emery. "It's also important to spread the word because not many people understand the connection between animal abuse and domestic violence and how sheltering pets could save a person's life."

Don't give up

Anderson says URIPALS helped save her and her family. Having her pets by her side as she heals has made all the difference. "When there is no one else in the middle of the night talking to us, we talk to them," she says. "They listen to everything and they don't tell anyone."

Anderson's message to others is this: "Don't give up, because there are resources out there. Everybody's story is different but the same. Don't leave your pets behind if you can, even if you have to rehome them. ... Get on the phone and call until somebody listens." **dvm360**

How the veterinary industry is helping

A number of industry leaders are helping keep victims of domestic violence and their pets together by committing thousands of dollars toward building supplies, training, and other resources required to make shelters pet friendly.

The Purple Leash Project was borne of a partnership between Red Rover and Purina to help fund renovations to make more U.S. domestic abuse shelters pet-friendly through grants of up to \$20,000 for building materials and other supplies. Purina has committed more than \$500,000 to fund project grants. Additionally, Purina and Red Rover are providing trained volunteers to help with renovations and provide pet food, supplies and other resources for pet owners escaping abuse.

Bayer has donated \$90,000 to nine domestic violence shelters through its Grants Fur Families, a program that enables domestic violence shelters to offer on-site pet care. Each recipient receives \$10,000 to create, maintain and enhance pet-safe spaces.

The Banfield Foundation, one of URIPALS's partners, has joined forces with professional football player and pet advocate Russell Wilson to help raise awareness about domestic violence and its link to animal abuse. In March 2019, the foundation announced its commitment to raising awareness of this issue by investing \$1 million over four years through its new Safer Together initiative, a program designed to help victims of domestic violence and their pets find safety together.



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1. ZMR: Trend Analysis of AlphaTRAK Unit Sales, 2012-2014

2. Data on file, Zoetis Market Research: Blood Glucose Monitoring Report. July 2017, Zoetis Inc.

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Evidence for CBD

> Continued from cover

themselves. All of this needs to be unraveled before the veterinary profession has clarity, and while this unraveling is happening, demand is growing faster. Existing research usually gets a spotty summarization in most veterinary lectures on CBD—for one, there’s never enough time to explain it all, and two, the story is not complete.

Even so, research data is not what most veterinarians want to hear. They want to know about clinical usage. Unfortunately, the data is not yet translatable into reliable clinical information for all the claims made. While more than 23,000 scientific papers have been published on cannabinoids in humans, lab animals and 24 species of companion animals, the jury is still out on exactly what CBD products are effective for and what they are not.

Plus, despite a relatively good therapeutic safety index, CBD products can cause harm, so caution is necessary. If they do cause problems, and a veterinarian has been involved in recommending them, that person can be held legally responsible for the outcome, and this includes both civil and criminal liability.

Legal and regulatory issues aside (because those seem to change almost daily—and you should definitely stay in touch with veterinary legal experts in your state for specifics), what exactly do we know about the science and clinical value of CBD so far?

Several experts spoke at the 2019 Fetch dvm360 conference about their experience and knowledge of CBD, including some case-based information on its use in veterinary medicine. Robert Silver, DVM, MS, CVA, chief medical officer for Rx Vitamins and a practicing small animal veterinarian in Colorado, is seeing some trends and passed along what he recommends so far. Stephen Cital, RVT, RLAT, SRA, VCCS, CVPP, VTS-LAM, co-founder of the Veterinary Cannabis Academy and director of education and development for ElleVet Sciences, added his expertise as well.

Dosing

The generally accepted therapeutic dose range for CBD in animals has been 0.1 to 0.5 mg/kg twice daily,

with the understanding that you can go as high as 5 mg/kg twice daily. However, according to Dr. Silver and Cital, dosing as high as 8 mg/kg has been shown to be safe,¹ although this is not very cost-effective or practical. Cital notes that dosing has been updated to 0.1 to 2 mg/kg twice daily based on now-available canine and feline data.

Also, these experts say, not all patients will respond the same to standardized dosing. It is speculated that animals may need to have an endogenous “deficiency” in the endocannabinoid system to respond to these products.

As far as we know at this time, Dr. Silver says, cats and dogs should be treated the same way.

Route

The most commonly accepted route of administration at this time is oral, Dr. Silver and Cital say. Although there are many forms of CBD and routes to choose from (concentrates, topicals, transdermals, vaporizers, nebulizers, suppositories, capsules or tablets, soft chews, powders, biscuits and so on), these are all still being studied in animals. Since bioavailability will be different for different routes, the recommendations for each will be different, and there are no guidelines yet.

Cital also warns that any transdermal or inhalation route will bypass first-pass metabolism through the liver. So “inhalers or vaporizers may be the new wave, but be very careful using this route,” he says, noting that there’s a lack of evidence in companion animals as well.

Pain management

Lower doses of CBD are generally adequate for neuropathic pain, but higher doses are often necessary for conditions causing chronic pain and inflammation such as osteoarthritis (OA), says Dr. Silver. Cital suggests starting with 1 to 2 mg/kg twice daily as support for either form of discomfort and titrating to effect. NSAIDs and cannabinoids can act synergistically, so dual use may lower the necessary dose of either.

Dr. Silver has been finding 0.5 mg/kg twice daily to be effective, and he reports that other veterinarians also find lower doses to work

well for painful patients. “I believe it’s worthwhile to start at this lower dose, which may provide a successful outcome, in order to reduce the cost and amount of hemp extract to be administered,” he says. The use of CBD together with opioids may allow a reduction in opioid doses, as CBD indirectly stimulates opioid receptors, producing an opioid-sparing effect, he says.

Cancer

Cannabinoids appear to be able to fight cancer, possibly through the induction of cancer cell death, anti-angiogenesis and some anti-metastatic properties, these experts say. Cital reports that an in vitro study looking at three different canine cancer cell lines was just completed by Joseph J. Wakshlag, DVM, PhD, at Cornell University, with results expected out by 2020. Dr. Wakshlag is also working on a quality of life in vivo study.

While Dr. Silver cautions that many claims surrounding CBD and cancer are, so far, not based in evidence, he also says researchers have discovered the presence of cannabinoid receptors on tumor cells. He knows of a veterinary oncologist who was treating a lingual mass using non-tetrahydrocannabinol (THC) CBD as a sole treatment (0.5 mg/kg twice daily). Six weeks later the mass was reduced to nearly nothing.

Another anecdote involved a dog with an appendicular fibrosarcoma whose owners did not want to amputate. Non-CBD-containing nutraceuticals were used first, with success, for one year, and then the tumor started to grow again. The patient was started on a 1:1 CBD:THC product, and within 90 days the tumor had shrunk dramatically. In another account, a dog with an undifferentiated nasal carcinoma with bone lysis was treated with a non-THC CBD product (0.4 mg/kg twice daily), and the tumor shrunk significantly over six weeks of treatment. The dog was still in remission 14 months later.

Tolerance

All humans and animals have been shown to develop tolerance to certain cannabinoids, such as THC,

with chronic use, these experts say. This means if you’re using them successfully for cancer treatment and then stop, the cancer may recur. If it does, as is the case with some other chemotherapeutic drugs, the tumor has usually developed tolerance to CBD products, according to pet owners and oncologists who’ve observed this phenomenon anecdotally. It’s important to warn clients about this. “If you get a tumor response and stop, it will come back, and it will come back resistant,” Dr. Silver warns.

It’s also speculated that second-hand smoke may create THC tolerance in animals, Dr. Silver says, but further studies are needed.

Seizures

THC itself is psychotropic, so it is *not* considered an anti-seizure drug—it has been reported to actually cause seizures. Therefore, any THC in a CBD product could theoretically make a seizure patient worse, but studies are incomplete. Cital notes that the manufacturer of the FDA-approved CBD medication Epidiolex conducted a 56-week-long study of rats and dogs at high doses of both THC and CBD (roughly 25 mg/kg twice daily) and were unable to induce any seizures in dogs.

However, Dr. Silver warns, “we are in the infancy of use [of CBD products] adjunctively with epileptic medications.” He describes a Colorado State University study of CBD for refractory epilepsy (2.5 mg/kg twice daily) in which some dogs experienced a 40% reduction in seizures—not a very impressive result, Dr. Silver says.² A new study at a higher dose (4.5 mg/kg twice daily) is taking place now, but it’s too early to draw valuable conclusions. Still, he says, for uncomplicated seizures that aren’t frequent or are well-controlled with anticonvulsant drugs, veterinarians and pet owners are finding that 0.5 to 1.0 mg/kg of CBD twice daily can control seizures and, in some cases, allow for reduced doses of anti-epileptic drugs.

Michelle Carnes, MS, DVM, DACVIM, a veterinary neurologist who gave an update on seizure management at Fetch dvm360 in 2019, does not recommend using CBD products in seizure

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patients at this time. She says the oral bioavailability of many CBD products is poor, and CBD is a potent inhibitor of cytochrome P450 with a long half-life in dogs that could potentially interfere with other medications.

“There are still no extensive studies in dogs,” she says, describing the same CSU study that found little improvement in canine epilepsy when CBD was used as an adjunctive drug.² She reports that popular thinking surrounding use of CBD in animals with epilepsy originates from the treatment of seizures with Epidiolex in children with severe, difficult-to-treat forms of epilepsy.

“This drug is extremely expensive and has now been reclassified as a schedule 5 drug,” Dr. Carnes says. It would not be affordable, or easily available, for veterinary patients at this time, even if it was found to be effective. “That aside, if we take the average human CBD product, using the current recommended dose in humans (5 to 10 mg/kg), and extrapolate this to dogs, the cost would be \$444 per month for a 20-kg dog.”

Dr. Carnes is not opposed to CBD, but at this time her conclusion is that it is “expensive, unregulated, and the purity is not [adequate]” for use in dogs with epilepsy, adding that it may be a long time before it is found useful.

Metabolism

CBD is metabolized by the cytochrome P450 system in the liver, which means drug competition problems are possible. According to Dr. Silver, this process has not been studied well, but rising alkaline phosphatase (ALP) levels with CBD use have been consistently noted in studies.^{1,2} He says the CSU study found that concurrent use of CBD appeared not to change phenobarbital or potassium bromide blood levels, but this was only a pilot study.² Larger studies are taking place now.

Dr. Carnes delivered an anecdotal metabolic warning in her lecture, describing a case study—her own case—in which (unbeknownst to her) the owner gave CBD to his difficult-to-control epileptic dog for a period of eight months. The dog was already on a moderate dose of phenobarbital. He had no seizures

for those eight months, but his phenobarbital levels went from 30 to 50 µg/ml in that time. The dog became ataxic and weak, his liver values went “through the roof,” and the dog died of liver failure shortly thereafter. Dr. Carnes warns veterinarians to “remind clients that CBD is still a drug!”

Cital reports that, despite these concerns, veterinary pharmacologist Dawn Boothe, DVM, MS, PhD, DACVIM, DACVCP, has personally reported no drug interactions or adverse effects associated with CBD and seizure medication combination therapies in her work at Auburn University. He also notes that “not all CBD products are alike.” They may contain varying levels of cannabinoids, terpenes and contaminants that may either help or endanger a patient. When clients are using CBD products on pets without guidance, anything can happen. It’s truly “buyer beware,” Cital says.

Adverse effects and toxicity

Diarrhea seems to be a common adverse effect with CBD, but so far studies don’t seem to be showing any long-term adverse effects associated with bloodwork or urine testing.³ However, these experts say, the study lengths might be too short and the parameters too narrow at this time, with researchers needing more time for analysis. More recently a 12-week-long study in dogs and cats was published noting no statistical changes or concerns on physical examination, complete blood count or serum chemistry profiles.⁴

THC toxicoses, on the other hand, are a major problem, and veterinarians need to at least advise clients to avoid harming their pets. “Too often in Colorado people are getting adult medical marijuana and giving it to pets,” says Dr. Silver. “Human doses of these drugs will send pets to the ER. Hemp products do contain THC and can cause typical signs of THC toxicity, but they are more mild effects.”

Here’s one important message that’s consistent from all specialists: No human edibles! “There is a huge risk of xylitol toxicity,” Dr. Silver says. Cital reports that products may also include grape and raisin extracts

without careful labeling. Cital also notes that toxic contaminants in poorly produced products could also be dangerous to pets.

Future hopefuls

There’s lots of enthusiasm for the therapeutic use of hemp products, even those with THC, for medicinal human and animal use. Cital notes a long list of potential future usages, including eye drops for glaucoma, tumor injections, stimulation of bone growth, safe sedation for puppies and young animals, anesthesia induction, inhalers for lung cancer (CBD may have pulmonary cytoprotective properties), pain relievers from certain parts of the plant, antifungal and antimicrobial bedding for animals, treatment for chronic cystitis in cats, use for chronic dermatitis in dogs and cats, and treatment of inflammatory bowel disease, among others. Another use for hemp products is biowaste cleanup—they’re able to absorb pollutants from the environment and can be used to reduce the effects of greenhouse gases.

How to choose a CBD product

In the absence of clear guidelines, what should veterinarians look for in a CBD product? A National Animal Supplement Counsel (NASC) Seal of Quality Assurance is a good start. The NASC is a trade group for nutraceuticals that’s taking the lead on trying to regulate the safety of commercial cannabis and hemp products, Dr. Silver says. Both Dr. Silver and Cital recommend that a certificate of analysis indicating potency, per-dosing unit, all ingredients, and the presence of mycotoxins, metals or pesticides can help you determine if a product is reasonably safe. Sadly, many manufacturers do not provide this information or offer only a limited version. Hopefully this will improve over time, these experts say.

Science

Why does this herb have such biomedical value? At least part of it, Dr. Silver reports, is that the body makes its own endocannabinoids as part of the nervous system, or at least as a partner to it. There are

cannabinoid receptors in the brain, heart, lungs, liver, spleen, intestinal tract, muscles, bone, reproductive system and circulatory system, among others. There is some evidence to suggest that the endocannabinoid system is responsible for the “runner’s high” in people. “It’s really the largest system in the body, but we didn’t even know about it until recently,” Dr. Silver says.

Conclusion

Many veterinarians have adopted a “Well, it can’t hurt” attitude when it comes to CBD. Others have been reluctant to discuss these products at all. Neither approach appears to be the correct one. We as veterinarians should be careful recommending these products and urge our clients to be cautious as well, taking a position of “harm reduction.”

“If we cannot answer client questions at this time, we can at least become more knowledgeable until we can,” Dr. Silver says. Remember, anything that sounds too good to be true usually is, but CBD products may just turn out to have some astonishing medicinal values. We just can’t tell you what they are yet. **dvm360**

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Dr. Carla Johnson practices emergency medicine at Berkeley Dog and Cat Hospital in Berkeley, California, and general practice at Cameron Veterinary Hospital in Sunnyvale, California. Her nonveterinary loves are writing, dressage with her Iberian warmblood mare, watercolor painting, yoga and running with her dog Tyson. Try as she might, her curly-coated Scottish fold Hootie refuses to go jogging with her.



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An update on tick control from Michael Dryden at Fetch dvm360

Well-known parasitologist discusses West Coast species, product options. *By Kristi Reimer Fender*

Unlike fleas and heartworms, which are the same species wherever they're found, ticks are very regionally focused, says Michael Dryden, DVM, MS, PhD, who spoke at the Fetch dvm360 conference in San Diego last month. Fortunately, of the 850 species of ticks worldwide, and the 90 present in North America, only a handful transmit diseases of concern to dogs and cats—and even fewer of those are on the West Coast. Those species were the focus of Dr. Dryden's lecture.

First up, Dr. Dryden discussed *Ixodes pacificus*, the West Coast counterpart to *Ixodes scapularis*, the infamous deer tick found throughout the Northeast and upper Midwest that transmits *Borrelia burgdorferi*, the Lyme disease bacteria that infects people and dogs. *I. pacificus* also can infect its host with Lyme disease, but there are some notable differences in the West Coast life cycle that Dr. Dryden highlighted.

First of all, *I. pacificus* feeds on a range of hosts. These hosts can include deer, but deer don't drive the tick life cycle like they do in the East. Also, on the West Coast, only 1% to 2% of adult *I. pacificus* ticks are found to have the Lyme disease pathogen, as opposed to 40% to 60% of *I. scapularis* adults in the East. Why is this?

In a word, lizards. "The larvae and nymphs of *Ixodes* love lizards," Dr. Dryden said—particularly the western fence lizard and the southern alligator lizard. "Their blood kills *Borrelia*. If a larva feeds on a rat and gets *Borrelia* and then becomes a nymph, and the nymph feeds on a lizard, it no longer has *Borrelia*."

Bottom line? "Yes, we have Lyme disease in California, but it will never be like it is in the Northeast and upper Midwest," Dr. Dryden said. *Anaplasma phagocytophilum* is actually more of a risk from *Ixodes* ticks in the West, he says, "because lizard blood doesn't kill it."



The western fence lizard neutralizes the *Borrelia burgdorferi* pathogen, rendering *Ixodes pacificus* incapable of transmitting Lyme disease.

Dermacentor variabilis, the American dog tick, is not a native West Coast tick, "but we brought it here," Dr. Dryden said. It and its cousin, *Dermacentor andersoni*, found in elevations above 4,500 feet, both transmit Rocky Mountain spotted fever, tularemia and tick paralysis. Another *Dermacentor* species, *occidentalis*, is also a concern for Rocky Mountain spotted fever and can occur in "astronomical numbers" when it senses the skin oil of a host left on a blade of grass or shrub.

Rhipicephalus sanguineus, the brown dog tick, "loves dogs in all stages," Dr. Dryden said. It inhabits buildings (unlike other tick species) and is showing surprising increases in population. It's responsible for a recent outbreak of Rocky Mountain spotted fever on western Indian reservations. "This tick is expanding in the southwestern U.S. and we don't know why," Dr. Dryden said. "It's also the only tick where we're seeing acaricide resistance, including to permethrin."

The goal of tick control products, Dr. Dryden said, is to kill what's attached currently and prevent new ticks from attaching. Topical acaricides include amitraz, fipronil, pyrethroids and combinations of the above. Fipronil is a good acaricide, he said—"as good as it ever has been"—but distribution over the animal can be an issue. The product spreads via hair-to-hair translocation prompted by the animal's grooming and other movements

(not through skin lipid diffusion, contrary to popular belief). "You're never going to have uniform concentrations," Dr. Dryden said.

The isoxazoline class of products appears to kill ticks more effectively than previous options, and the theory is that it's because they work systemically, so they provide consistent coverage over the whole animal, Dr. Dryden said. "These products can eliminate *Rhipicephalus* infestations when nothing did before," he said.

They also prevent *Borrelia*, *Anaplasma* and *Babesia* infections by killing ticks before they've been attached long enough to transmit pathogens. There is no data on Rocky Mountain spotted fever, Dr. Dryden noted, while *Ehrlichia* is an area of concern since it can be transmitted in as little as three hours, Dr. Dryden said.

"Can we kill the tick before it transmits a pathogen? That's the key. Because we can't repel them all," he said. "But the largest-selling class of pet product in the world is isoxazolines. And that doesn't happen unless it's performing well and found to be safe." **dvm360**



What about fleas?

To find out what Dr. Dryden had to say about what's new in flea control, visit **dvm360.com/drydenfleas**.

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Wandering cat finds her way back to owner—and a Nationwide Hambone Award

A tearful plea to a deceased loved one is followed quickly by missing pet's return. Is a guardian angel responsible?

The adventurous cat Minnow, of Alpharetta, Georgia, recently earned the “Most Unusual Pet Insurance Claim of the Year” for the 11th annual Hambone Award conducted by Nationwide pet insurance.

Minnow was treated by the veterinary team at Midway Animal Hospital in Alpharetta, which in turn received \$10,000 from Nationwide through the Veterinary Care Foundation to help treat pets in their community whose owners could not otherwise afford treatment.

So what did Minnow do to earn fame and notoriety? Here's her story, adapted from the Hambone website.

When Andrea and her late husband, Graham, visited a local animal shelter, Andrea was drawn to a sweet, talkative cat named Minnow, but they wound up going home without adopting her. Andrea called the next day, only to learn that the cat had already been adopted. To her surprise, Graham presented her that evening with a gift: Minnow!

After Graham passed away, Andrea and Minnow eventually moved to the Atlanta area. Andrea tried to transition Minnow to an indoor-only lifestyle. But “she clearly wanted to be an outdoor cat,” Andrea says. “She'd go out a little farther each day, but I never worried because she always came back.”

However, when more and more time began to pass since Minnow had been home, Andrea did begin to worry. She went to work searching the neighborhood, but three weeks passed with no appearance from Minnow.

“I got in my car to go home, and I was in tears,” Andrea says. “I started talking to myself, and then I started talking to Graham. I said, ‘All right, Graham. You brought Minnow home the first time. Now I need you to bring her home again.’”

“The very next day, I'm throwing something in the trash can, and there's Minnow at the back door! I was in complete shock.”

Andrea took Minnow to Midway Animal Hospital in Alpharetta, where she was diagnosed with starvation, dehydration and a broken rib. Given all the cat had been through, the staff was impressed by her quick recovery.

The other finalists for this year's Hambone Award also earned their veterinary practices a portion of \$30,000 in total funds to treat pets in need:

- > **Second place.** Max, a Great Pyrenees from San Marcos, Texas, got more than he expected when his head got too close to a hog trap.
- > **Third place.** Jasper, a cat from Leander, Texas, was treated for heat exposure after narrowly escaping a dryer disaster when he got stuck in the fluff cycle.
- > **Fourth place.** Frank, a rottweiler from Keyport, New Jersey, found himself in a prickly situation after a porcupine put quills up his snout.
- > **Fifth place.** Tippy, a border collie mix from Arroyo Grande, California, barreled into a steel trailer hitch while playing and injured her snout.

“Our annual Hambone Award is a great reminder that pets can make remarkable recoveries because of the diligence of their owners and the incredible skills of their treating veterinarians,” says Carol McConnell, DVM, MBA, chief veterinary officer for Nationwide. “These veterinary practices will now have the opportunity to save more animals in need.”

All nominated pets have made full recoveries and received Nationwide reimbursements for eligible veterinary expenses, representatives say. **dvm360**



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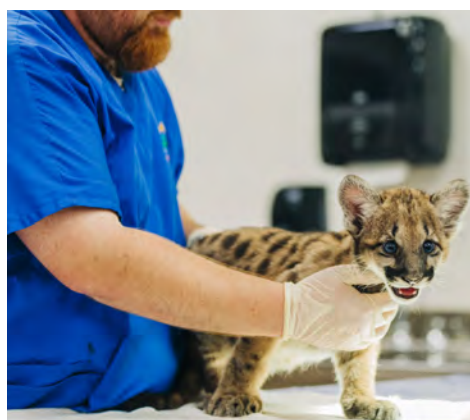
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Panther kittens rescued in Fla.

After mother succumbs to neurological disorder, veterinary experts work collaboratively to investigate and rehabilitate endangered feline species.



A team of veterinary and wildlife experts led by the Florida Fish and Wildlife Conservation Commission (FWC) is caring for a pair of endangered Florida panther kittens orphaned after their mother succumbed to an unknown neurological disorder affecting panthers and bobcats. The kittens are being cared for at ZooTampa at Lowry Park, a facility that is heavily involved in the rehabilitation of this endangered Florida species, according to a release from the zoo.

“We appreciate the support of the public and their concern for these kittens, who just received their latest examinations in a series of checkups,” says Lara Cusack, DVM, veterinarian at FWC’s Research Institute, in the release. “While veterinarians cannot predict to what degree the kittens may become affected [by neurological disease], they are currently active, playful and healthy overall.”

In July, Florida FWC trail cameras in Collier County caught sight of the kittens’ mother, a radio-collared panther, struggling to walk. With her young kittens unlikely to survive in the wild, FWC removed them for observation and testing. Their mother’s health deteriorated and she was humanely euthanized. Experts hope the mother’s necropsy results and extensive diagnostic testing will help experts determine what’s causing the condition.

The kittens were first cared for by Marc Havig, DVM, DACVS-SA, CCRP, and Ashley Ayoob, DVM, DACVIM, DACVECC, veterinarians with Animal Specialty Hospital of Florida, a BluePearl facility in Naples, Florida. “These vets initially cared for the kittens when they were first picked up by FWC,” says BluePearl representative Laura Fourniotis.

The kittens are now being housed at ZooTampa’s Catherine Lowry Straz Veterinary Hospital. Once they’re out of quarantine and receive health clearance from the medical team, the zoo plans to place them on public view where they can serve as ambassadors for their species. The kittens will remain at ZooTampa until a permanent home is identified. [dvm360](#)

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The ambiguous promises of a post-veterinary-career life

As a retired veterinarian, here are my thoughts on transitioning out of this career and why reinventing your identity is so important.

Most of us chose our profession as a matter of passion. It was something we always wanted to do, and we find our work extremely fulfilling. But our place in veterinary medicine is not a forever role. Time will pass and our involvement will decline. It seems like we become less relevant as the profession evolves—but a new chapter is approaching.

Most of us consider and in fact look forward to some sort of retirement. The questions become not so much “if?” but rather “when?” and, most of all, “how?” What will retirement from a veterinary career look like when it’s your turn?

Leading up to retirement

The period that precedes retirement is often one of the best stages of adult life. One study found that, for some people, “midlife is a time of highly stable work, family and romantic relationships. Our earning potential increases, our professional skills solidify; management and leadership skills grow. People increasingly occupy positions of

power and status, which might promote feelings of self-esteem.”¹

On the other hand, those approaching retirement frequently experience a change in family roles, such as an empty nest, obsolete work skills, and a lack of recognition and identity; unfortunately this is often accompanied by physical limitations and declining health. Physical ailments aren’t the only things that seem to get worse as people get older. Friends and family relocate, and self-esteem often declines around the age of retirement.

I speak from experience. While I am no longer involved in practice, I will always be grateful for all that veterinary medicine gave me, and I wish the same for my colleagues.

Health consequences of retirement

Studies aimed at the impact of retirement on the health of retirees have produced ambiguous results. Many people look forward to retirement with anticipation of a new freedom and an opportunity to self-explore. While retirement is the

beginning of a new chapter characterized by economic security and a renewed curiosity, many studies have reported negative consequences of retirement on physical, mental and self-assessed health along with potential reductions in psychological wellbeing.

I have always been concerned when people introduce themselves saying, “I am a veterinarian.” They define who they are by what they do. I worry about what happens when veterinary medicine becomes less a part of life and their sense of identity wanes.

I spent nearly 40 years involved in several theaters of veterinary medicine, from clinical practice to volunteer organizational medicine and leadership; from educational development to professional medical education. Then that day came. After 40 years in medicine, I realized I was ready for another chapter. That realization came at a coincidental time when my veterinary license was due for renewal. I had to do some soul searching. “Do I renew my license?”

While I was still technically a veterinarian, the likelihood of my practicing was nil. So I chose not to renew my license. The decision certainly had nothing to do with fees or continuing education requirements. I knew it was time to close a book that had been my life for so long. That night was a bit fitful. I was consciously and totally retired from my chosen profession. What would come next?

Will retirement deliver on its promise?

Ultimately, the uncertainties of retirement come to the fore. Instead of asking, “What will I do this weekend?” you start to wonder “What now?” ... “Will I be bored?” ... “Will I have enough money?” ... “Am I saving enough?” While financial security is certainly critical, people need to amass more than money for a successful retirement, experts say.

You probably concern yourself with finances, but you might need to think about the psychological effect retirement may have on you, including the >>



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8 tips to help you better adjust to retirement



Recognize that there are stages of emotions.



Structure your days.



Set small, achievable goals.



Cultivate both old and new friendships.



Consider part-time employment or volunteer work.



Periodically review your budget.



Give yourself time and permission to experiment with what you want to do and who you want to be—the joy of retirement is that you'll have plenty of opportunities to experiment.

loss of your career identity, the fracturing of your professional networks and spending more time than ever before with your spouse or significant other.

Retirement is not just an event. It's a process of transition and it takes time. Some people actually fail at retirement. They forget that it's like preparing for a trip: Where are you going? How will you travel? There's a lot of prep work people can do leading up to retirement.

Some aspects of retirement are more difficult than others. Changes in career identity and activities are big in the early years of retirement. We quickly lose our edge, our network and our expertise, and we must essentially reinvent ourselves.

Personally, I greeted retirement not only with anticipation but with trepidation. One of the biggest challenges is the loss of identity. This new phase of your life can be a little difficult to navigate at first. It's up to you to design the type of day—and kind of life—that you want to live. [dvm360](#)

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Dr. Michael Paul is the former executive director of the Companion Animal Parasite Council and a former president of the American Animal Hospital Association. He is currently the principal of MAGPIE Veterinary Consulting. He is retired from practice and lives in Anguilla, British West Indies.

Letter to dvm360: Suicide hotline works

Disturbed to hear about a long hold time, this veterinarian and social worker wants people to know that the calls do get through.

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I'm sorry to have read that the author of "Beyond the suicide hotline" in the September 2019 issue of *dvm360* magazine (see dvm360.com/suicide-hotline) learned of an exceptionally long hold during a call to the National Suicide Prevention Lifeline (NSPL). As a practicing small animal veterinarian and licensed social worker, I answer calls to the NSPL working as an emergency services counselor (ESC) for the behavioral health services of the

DuPage County Health Department. There are three to five ESCs working each shift, 24/7, and we each handle two to four calls to the NSPL per shift. My experience is that none of us have ever placed a call on hold; if necessary, we have a colleague make a 911 call while still speaking to a caller or converse with a caller while looking for appropriate resources. The NSPL does include an FAQ with the question, "How do I submit

a complaint, compliment or other feedback?" and an answer that leads to a contact page. The public can use that in case they have a troubling experience with a call taker on the NSPL. Thank you for allowing me to offer this feedback, as I would not want anyone to not call the suicide prevention line because of a complaint addressed in your publication.
—Tom Favale, DVM, MSW, LSW
Wheaton, Illinois

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When an associate is in a 'dark place'

How much is too much when asking about a troubled associate's personal problems? And what can a practice owner do to help? This 'what if?' scenario uncovers some major questions for veterinary professionals.



Resource list

If you or another veterinary professional needs help, or if you'd like to dig deeper into the veterinary profession's mental health resources, visit dvm360.com/mentalhealthlist.

The 62-year-old Dr. Carl Sweet employs six veterinarians and a total staff of 42, with no plans to retire. He has a capable team, but he remains the hands-on leader in all facets of the practice. His veterinary associates are highly skilled, and he encourages autonomy by not micromanaging their daily cases. However, one of those associates, Dr. Sheila

Case, has caught his attention.

She has been with the practice for three years and is an excellent clinician, but Dr. Sweet has found out that she's started coming in late to work and that her mood has changed. Dr. Sweet prides himself on maintaining a professional work atmosphere and not intruding in the personal lives of his staff. But in this instance, he believes it's

appropriate to speak to Dr. Case about these changes.

He arranges a meeting with her and brings up the issues of concern, and the young veterinarian is very frank with him. She explains she's experienced some difficult personal life events and is facing mounting financial issues. She tells Dr. Sweet that she's been sleeping more and going to what she calls a "dark

place.” She tells him that she hopes that she can keep her job and that she’ll make every effort to resolve the issues at work. Dr. Sweet tells her he understands and will help her any way he can.

Dr. Sweet has never encountered an issue of this nature with any of his staff members before, and he realizes that he’s upset after the meeting. If an employee suffers an animal bite, he knows just what to do. But Dr. Sweet worries that trying to address mental health issues for an employee would violate her privacy. He wonders if a generic offer to help is enough. Is she depressed? he wonders. Will Dr. Case hurt herself?

Then Dr. Sweet thinks about the clinic’s controlled substances with lethal potential. He schedules another meeting with Dr. Case and tells her that after their previous conversation he wants to offer her more assistance. He suggests that he arrange an appointment with a mental healthcare professional while maintaining strict confidentiality. She thanks him for his concern but declines further help.

Dr. Sweet feels he’s done all he can now to assist the young veterinarian and hopes she’ll get help on her own. He also reaches out to his state veterinary association to see if there are resources available to help in situations like this, and he’s disappointed to find out that only reactive programs for veterinarians fighting substance abuse and depression are available. His research yields no proactive, pre-intervention programs. He decides simply to continue being vigilant and checking his controlled substances log to make sure nothing goes missing.

Has Dr. Sweet done all that he could for his colleague? Email us and let us know at dvm360news@mmhgroup.com.

Dr. Rosenberg’s response

It’s certainly distressing to know that the suicide rate among veterinarians is three times the national average. A combination of factors, not the least of which is access to controlled dangerous substances, accounts for this unfortunate statistic. The AVMA has recognized

and prioritized this issue by offering mental wellbeing resources to its membership.

This, however, may not be enough. The combination of workplace pressure, emotional distress and monetary debt can be helped only so much by healthcare

programs. Those working in veterinary hospitals themselves must help by recognizing and correcting workplace stressors that can negatively affect the mental health of veterinary professionals. The veterinary workplace should be a comfort zone, not a pressure cooker. **dvm360**

Dr. Marc Rosenberg is director of the Voorhees Veterinary Center in Voorhees, New Jersey. Although many of the scenarios Dr. Rosenberg describes in his column are based on real-life events, the veterinary practices, doctors and employees described are fictional.

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The next recession is coming. Here's what to do now

The 'R' word is an economic inevitability, but that doesn't mean you should panic. Take these five steps to prepare your veterinary practice for the next downturn.

There's no crystal ball to tell us when the next recession will occur or how severe it will be. But economists do rely on a set of key economic indicators to help gauge the performance of the economy and what direction it's heading in. These key indicators—including unemployment, consumer sentiment and others—suggest the economy remains healthy as I write this in late October. But we do know there will be another recession eventually. They're a normal part of the economic cycle.

Whether the next downturn starts in months or years, there's no reason to panic. But there's always good reason to prepare. Forward-thinking business owners can actually make recessions work in their favor.

Five ways to shore up your practice now

The actions you take in a strong economy can set you up to reap dividends when a downturn arrives. Here are important steps you can take now to safeguard both your practice and your personal finances once a recession hits:

1 Reduce the debt on your books. In a recession, you'll have lower sales and less available cash.

That calls for deft financial management. If your business is heavily in debt, you may be more vulnerable. Do what you can to reduce your debt burden now by consolidating loans or refinancing at a lower interest rate. Studies have shown that

many businesses that failed during the Great Recession had much higher debt-to-asset ratios than those that survived and thrived.

2 Strengthen and build your business. Now is the time to be aggressive in seeking new clients and building stronger relationships with current ones. It can be tempting to take it easy when times are

good, but the exact opposite is the wiser course. Building during boom times helps insulate against a recession. Work extra hard to help your existing clients understand the

importance of compliance with preventive healthcare guidelines now, when the healthy economy means they're more likely to prioritize veterinary care. Similarly, now is not the time to cut back on work hours if you can avoid it.

3 Invest in digital technology. It's tempting to think of battenning down the hatches during uncertain economic times, but improving your technology now can put you in a better position to manage uncertainty. If you've been considering experimenting with telemedicine, a client-facing app, or texting or analytics platforms, committing now can put you in a better position during the inevitable downturn.

4 Examine your decision-making process. In the last recession, companies that decentralized decision-making fared better than those that clung to authority. Leaders who passed authority farther down the chain of command found that their employees remained more committed and involved. Though it might make you feel uneasy, work on delegating various elements of your practice oversight. At the very least, seek more input from employees at all levels.



Monitor these key economic indicators

AVMA's economists recommend that veterinarians get in the habit of tracking four key economic indicators for signs of recession. You can do this very quickly on a daily basis. Just five to 10 minutes with your morning coffee will keep you informed. Here's what to keep an eye on:

1. Unemployment rate. Recently, the U.S. unemployment rate has been hovering near its 50-year low, which should be reassuring. What matters most is change over time. If the unemployment rate rises quickly, that almost guarantees a recession has begun.

2. Yield curve inversion. Long-term investments normally earn higher interest than short-term. In a yield curve inversion, this is reversed. For example, a three-month U.S. Treasury bond may pay a higher rate of return than a 10-year bond. This means investors have low confidence in the economy. A yield curve inversion usually shows up well in advance of a recession, so there's no need to panic. It can take as long as two years for a recession to develop after this happens.

3. University of Michigan Index of Consumer Sentiment. Consumer spending drives our economy. This monthly index tracks how confident consumers are that the economy is healthy. Look for long-term changes rather than one-month fluctuations—for example, a 15% year-over-year drop lasting for several months.

4. Manufacturing sector Purchasing Managers Index (PMI). Each month, the Institute for Supply Management surveys its members, then aggregates the data on a scale of 1 to 100. If the PMI is 50 or above, manufacturing expanded that month. Below 50, the sector contracted. Manufacturing no longer drives the U.S. economy, so a dip in the PMI is not as significant as it used to be. Steep downturns are a sign of trouble, but not necessarily a guarantee that recession has arrived.

Remember: Recessions are normal, so don't overreact to either positive or negative financial news. Stay informed, but don't dwell on the negative. A relentless focus on streamlining your practice and achieving your goals is the best way to weather any downturn.

5

Avoid layoffs if possible, even when the recession hits. Look beyond headcount reduction to strengthen your practice's

finances. Layoffs hurt productivity and morale. If you need to cut payroll costs, consider alternatives such as furloughs, reduced hours, or reduction or elimination of performance pay. Above all, be transparent with your staff in advance about your need to reduce expenses. You might be amazed by the ideas they come up with, given the chance.

Resources to bolster your practice against recession

The AVMA has numerous tools to help you strengthen your practice before and during a recession. These include a market share calculator, marketing and social media materials, HR resources for everything from team-building to payroll, and even a purchasing tool (AVMA Direct Connect) that includes

real-time price comparisons for consumer pharmacies.

The newly redesigned AVMA website includes a dedicated practice management section and a personal finance section, too. Visit avma.org/PracticeManagement and avma.org/PersonalFinance.

The AVMA also has a growing library of business and financial CE on AVMA Axon. Check the financial health section at axon.avma.org for timely material on both practice and personal finances, including courses we offered at October's AVMA Economic Summit.

If you're an AVMA member, please don't hesitate to reach out to me or any member of our economics team with questions. We have a huge variety of economic and practice data, and we love nothing more than to share it. **dvm360**

Matthew Salois, PhD, is chief economist and director of the Veterinary Economics Division at the AVMA.

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Production-based pay: The devil's in the details

Here's what to think through before you sign your associate employment contract—consider the things that could go wrong or negatively affect your production income.

My office received a good deal of response to last month's column (see dvm360.com/rippedoff) about production-and-salary-based compensation for veterinary associates sometimes known as "ProSal." A number of readers asked for more details about handling these offers. Happy to oblige—this compensation arrangement is often complex and increasingly ubiquitous in the veterinary marketplace. (*Editor's note: Mark Opperman, CVPM, argues that ProSal refers to his specific production-plus-salary formula that gets lumped in with all production-based pay plans. See*

dvm360.com/prosal for the basics.)

To a large extent, the "production/salary" description is misleading. This compensation "scheme" (you pick whether that term is descriptive or pejorative) involves neither a genuine salary—nor a true production-based pay arrangement. It's complicated.

Basics of a typical production-salary compensation deal

The term "salary" implies that at the end of each pay period, an associate receives a paycheck that represents a pro-rata portion of some agreed-on annual figure. Then comes the

"production." Most salary-production contracts for associates come in one of two flavors.

Flavor No. 1: Salary based on future earnings. This is the less common version, where the employer will pay the associate, say, 20% of her "total credited production amount" as her pay for the year. The associate is paid every two weeks throughout the year. This "salary" then is not so much a guaranteed amount but rather a "draw" against an anticipated 20% of production to be determined once the year ends. So, if the "salary" (draw) for 2018 was \$100,000 but production was only \$400,000, then the practice

owner considers the associate overpaid, and the "salary" may be dropped in 2019 to make up for the shortfall. The 20% figure remains unchanged, but the take-home pay will be adjusted downward.

Flavor No. 2: Salary and bonus. Employers don't like employees owing them money, so it's more common to see a "salary and bonus" scheme in associate contracts. Here, a "salary" is set at roughly 75% to 80% of the associate's anticipated end-of-quarter or end-of-year earnings. If the employed doctor is productive, she receives the difference between, say, 20% of her generated and credited revenue

and the “salary” she got paid weekly or biweekly. The extra money is a so-called “bonus.” This way, the clinic hopes not to have “overpaid” the associate at the end of the measuring period.

Salary is not guaranteed

In neither flavor of contract is there a guarantee that a certain pay rate (“salary”) will be maintained by the veterinary practice owner. Here’s why:

Nearly all associate veterinarian employment agreements are controlled by the at-will employment doctrine. This is usually spelled out in the agreement. At-will employment means the parties are obligated to provide the pay and perform the work described in a contract until (1) the associate quits or (2) the employer—subject to some marginally enforceable notice provisions—fires the associate.

Consequently, the employment contract is really more of a terms list describing what’s expected of the associate and what she’ll receive as long as both parties follow the contract. The practical effect of at-will status is that an employer may (with a bit of notice) alter the employment agreement, forcing the employed doctor to choose whether to quit or stay under the new arrangement. Basically, the associate doctor can be fired from the old contract and rehired later the same day at a different salary, production percentage or both.

Perhaps you should take a look at your contract for a paragraph like this: “Regular failures to meet production goals may result in our re-evaluation of the associate’s base salary.”

So, what’s the contract for then?

It might sound like an employment contract is a waste of time if nobody has to follow it for the one-year or five-year term it claims to cover. But that’s not actually the case. Each side does get something of value, although the employer ordinarily gets something of much more significant value.

The practice (usually the drafter of the agreement) has likely included a noncompetition provision that, if reasonable in time period and region, may well be enforced against the departing employed doctor. The associate, on the other hand, can rely on the courts or arbitrators to enforce the pay and benefits terms of the contract (paid leave, medical insurance reimbursement and so on), at least through the period of actual employment.

What’s out of your control—and in your control

Make sure any issues that could affect your compensation are covered in your contract. Let’s assume that a veterinary corporation hires Dr. A on a production-salary arrangement wherein he will receive a “base salary” of \$100,000 and a “bonus” of 20% for all production he generates in excess of \$500,000. Dr. A can then base his lifestyle (student loans, car payment, rent and so on) on the “salary” element of his compensation of \$100,000 minus taxes. But can he honestly count on that “salary”? That depends on whether he routinely meets his production goal of \$500,000. Maybe he can, maybe he can’t—the devil’s in the details. What are all the things in the practice that could affect Dr. A’s ability to meet his minimum productivity goals? Let’s see:

- What if the practice hires more DVMs than the clinic actually needs? This reduces Dr. A’s caseload.
- What if a competing corporation opens up across the street?
- What if the practice allows its social media presence to deteriorate, or someone makes a disparaging Facebook post that affects business?
- What if the practice’s accounts receivable process is faulty? Dr. A receives credit only for what’s paid.
- What if the manager who calculates production gets it wrong?

That last issue, of course, is one of the biggest. I’ve had numerous veterinarians tell me they were reluctant to take a job with a corporation using these compensation schemes because they didn’t feel their old employer was sufficiently transparent about how their production was calculated. My question to these doctors is this: “Whose job was it to make sure that your boss was honest, accurate and transparent about your production math?” The answer? The associates were.

As I’ve mentioned before on the subject of production-and-salary-based pay (or “commission sales,” as I also like to refer to it), it’d be sublime if veterinary associates could all sit back, relax and assume they’re getting full production credit for every single piece of work performed and that none of their work is being improperly credited to “the front desk” or “Dr. Hospital.” The world we live in, however, is sadly not so utopian. Follow the advice of former President Ronald Reagan: Trust but verify.

And one final note on keeping track of your production: When starting a new position, check the contract to see if it provides you the right to review all documents and records necessary to independently determine the accuracy of your production. If that language isn’t in there, request that it be added.

What counts as production

When selecting among multiple production-based pay job offers, look closely at what products and services do and don’t get credited toward your production. If the contracts you’re comparing give credit at different absolute percentages, don’t assume that the higher percentage offer is necessarily the better deal.

For example, a contract for 22% of production that excludes lab work “done by others” might be cause for concern. The clinic might have a policy of whisking away pets scheduled for routine heartworm and FeLV tests to the treatment area, where technicians perform the blood draw and report the results to the record. If you miss out on 10 or 20 of these “routine labs” per day, you might have done better getting credit for 20% of everything associated with your office visits rather than 22% of just the exam fee.

If the formula is hard to understand, get help

Never forget that associate employment agreements are a two-way street. You give up a lot—that noncompete and/or nonsolicitation clause will be there to burden you for years after you leave the job. So, if you’re giving up rights, shouldn’t you get a fair shake—or at least a shake you fully understand—before you take a job? Get input from a professional if you need help understanding your contract details.

These compensation schemes are sold to veterinary associates as an opportunity to gain extra income in exchange for doing extra work and being super-efficient on the job. But a contract weighted in favor of the employer can create financial problems and resentment—and not on the part of the employer. **dvm360**

Christopher J. Allen, DVM, JD, is president of Associates in Veterinary Law PC, which provides legal and consulting services exclusively to veterinarians. He can be reached at info@veterinarylaw.com. Dr. Allen also serves on dvm360 magazine’s Editorial Advisory Board.

MEDICINE | Surgery

Surgery STAT: The use of local anesthetic in spays and neuters



Adding locoregional anesthetics into routine ovariohysterectomy and orchiectomy protocols is a rapid, safe and inexpensive way to enhance pain control for our veterinary patients. *By Sarah Schock, DVM, and Stephanie Shaver, DVM, DACVS*

Multimodal pain control through the use of local anesthetics is a simple and inexpensive way to help control postoperative pain. Locoregional blocks performed during routine procedures such as ovariohysterectomies and orchiectomies are an effective way to help control pain at the level of the surgical site and improve patient outcomes.

Common locoregional blocks used for gonadectomy procedures include the intratesticular (IT) block for orchiectomies, and the intraperitoneal (IP) block and the splash block (a variation of the IP block) for ovariohysterectomies.

Locoregional blocks prevent transmission of nociceptive input and provide an important component of multimodal analgesia. Decreased pain scores have been appreciated in multiple studies evaluating IP bupivacaine administration in both dogs and cats, as well as reduced requirements for rescue analgesia.¹ During castration, the use of IT blocks results in similarly decreased pain scores and analgesia needs.² Lower postoperative cortisol levels have been identified after IT blocks² and with IP bupivacaine in dogs undergoing laparoscopic ovariohysterectomy.³ Lastly, decreased heart rate and mean arterial pressure were identified in patients that received IT lidocaine,⁴ suggesting a decreased response to surgical stimulation that may allow for less anesthetic gas and thereby decrease the cardiovascular side effects of inhalant anesthesia.

Here's how to perform the IT block, the IP block and the splash block.

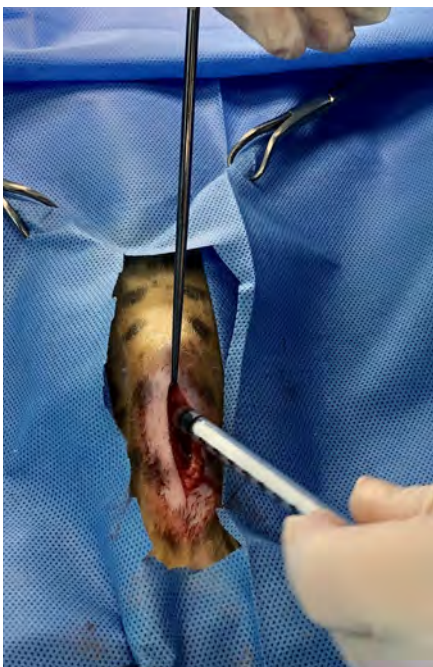


Figure 1: An intratesticular block is administered to an anesthetized patient preoperatively.



Figure 2: A spay hook is used to elevate the body wall to provide access for an intraperitoneal block after ovariohysterectomy.

Intratesticular block

For IT blocks, we recommend bupivacaine (0.5%) at 1 mg/kg for dogs and cats; the volume may be reduced as needed to avoid testicular distention. Bupivacaine has an onset time of 20 to 30 minutes and duration ranging from three to 10 hours. Here's the process:

1. Clip and scrub the scrotal and periscrotal region for orchiectomy. This block can be performed before the final scrub to allow time to take effect.
2. Prepare the local anesthetic in a syringe using a 22-ga needle (25-ga for small dogs and cats).

3. Using examination gloves, hold the testicle in one hand. Advance the needle into the center of the testicle.
4. Aspirate to ensure no blood is obtained, and inject half of the anesthetic drug directly into the testicle.² (See Figure 1.) Repeat on the second testicle.
5. Allow time for diffusion of the block to reach the spermatic cord.

Intraperitoneal block

For an IP block, we recommend bupivacaine (0.5%) at 3 mg/kg for dogs and 2 mg/kg for cats. Follow these steps:

1. Using aseptic technique, prepare the local anesthetic in a sterile syringe.
2. After completion of the ovariohysterectomy and prior to complete closure of the linea alba, gently lift the cranialmost

aspect of the incision with a spay hook and insert the syringe into the peritoneal cavity (see Figure 2).

3. Instill the local anesthetic into the peritoneal cavity.
4. Finish closing the linea alba and remaining incision. The use of additional incisional blocks in the subcutaneous tissue of the incision in one recent study did not show a decrease in postoperative pain scores.⁵

Splash block

For splash blocks, we recommend bupivacaine (0.5%) at 3 mg/kg for dogs and 2 mg/kg for cats.

1. Prepare as for the IP block.
2. Upon completion of the ovariohysterectomy, instill about a third of the local anesthetic directly onto each ovarian pedicle and uterine stump, applying equal volumes to each site. This is a more directed technique than the intraperitoneal block.
3. Variations include instilling the local anesthetic into the peritoneal space around the right and left ovarian pedicle and caudal uterus several minutes prior to starting the ovariohysterectomy. This technique was successful in cats given bupivacaine (0.25%) at 2 mg/kg.⁶

Conclusion

Adding locoregional anesthetics into routine ovariohysterectomy and orchiectomy protocols is a rapid, safe and inexpensive way to enhance pain control for our veterinary patients. A multimodal approach to postoperative pain control through the use of local blocks is technically achievable and easy to incorporate into daily practice. **dvm360**

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Dr. Sarah Schock is a small animal surgical intern at Northwestern University in Glendale, Arizona. In her free time, she enjoys running, riding horses and spending time with friends, family and her two cats. Dr. Stephanie Shaver is an ACVS-board-certified veterinary surgeon and assistant professor

of small animal surgery at Northwestern University. She enjoys hiking, travel, friends, family and teaching veterinary students.

Surgery STAT is a collaborative column between the American College of Veterinary Surgeons (ACVS) and dvm360 magazine. To locate a diplomate, visit ACVS's online directory, which includes practice setting, species emphasis and research interests, at acvs.org.

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What's new in veterinary vaccinology?

Today's veterinarians have choices in vaccines beyond the standard killed or modified-live formulations. But more options can also make for more confusion. Veterinary microbiologist Laurel Gershwin offers clarity.

By JoAnna Pendergrass, DVM

Vaccinology has long been at the heart of infectious disease prevention in veterinary medicine. Historically, modified-live virus (MLV) vaccines and killed vaccines have been the “go-to” formulations for veterinary patients. More recently, new vaccine formulations, such as the subunit vaccine, have entered the veterinary vaccinology landscape and expanded the number of options from which veterinarians can choose.

More options can certainly be a good thing, but they can also make for confusion when trying to decide which formulation would be best for a particular patient.

To wade through this changing landscape, Laurel Gershwin, DVM, PhD, DACVM, a professor at the University of California, Davis, School of Veterinary Medicine, presented information on traditional and newer vaccine technologies during a session at a recent Fetch dvm360 conference.

“Understanding the different types of vaccines is important,” Dr. Gershwin said, “because you have to know what kind of immune response you need. The pathogenesis of a particular disease may lend itself better to one particular vaccine versus another.”

For example, to immunize a horse against tetanus, a vaccine that induces an antibody response to neutralize the toxin would be ideal. To immunize against a systemic viral disease, a vaccine that induces an antibody response and cell-mediated immunity (CMI) may be preferable.

Regardless of formulation, the vaccine itself should be able to be administered with minimal discomfort to the patient and without adverse side effects.



Immunology in a nutshell

Before discussing vaccine formulations, Dr. Gershwin gave a brief refresher—“immunology in a nutshell,” in her words—on pathogen classifications, protective mechanisms against pathogens, and immune cells.

Pathogens can be intracellular, extracellular or facultative intracellular. Intracellular pathogens, which are primarily viruses, prefer moving from cell to cell but may also spend time in the vasculature; these pathogens are susceptible to antibodies. Extracellular pathogens, such as *Staphylococcus*, can often be eliminated with antibodies and phagocytic cells. Facultative intracellular pathogens, such as bacteria that can grow and replicate within phagocytic cells, often require an

immune response as for intracellular pathogens.

The body's different immune cells, she explained, elicit different immune responses: CD8 cytotoxic lymphocytes activate CMI, while CD4 T-helper cells activate antibody production.

The major histocompatibility complexes (MHCs), which are cell surface molecules, also play critical immunologic roles. MHC class I molecules are present on nearly every cell and present antigens that are produced within a cell and recognized by cytotoxic T cells, activating CMI. MHC class II molecules are present only on specific immune cells and present extracellular, foreign antigens that are recognized by T-helper cells, eliciting antibody production.

Traditional vaccine formulations

MLVs, such as the canine distemper vaccine, contain attenuated virus that replicates in the cytosol and is ultimately displayed by MHC class I. MLVs can also produce MHC class II antigen presentation. Thus, MLVs can stimulate both CMI and antibody responses.

MLVs have several drawbacks, however, including reversion to virulence. Additionally, viral attenuation may still be too strong for a suppressed immune system. Also, if a patient is seropositive, it is not possible to differentiate whether the seropositivity is due to MLV vaccination or previous infection.

Killed vaccines, such as the rabies vaccine, are usually administered with an adjuvant. The killed virus

enters macrophages and dendritic cells and is degraded into peptide fragments that are presented via MHC class II.

Differentiation is also not possible with killed vaccines. This drawback of traditional vaccine formulations can be especially problematic for FIV-positive cats. Extra testing, such as polymerase chain reaction, could differentiate but is expensive and time-consuming.

New vaccine formulations

New vaccination formulations, known as DIVA vaccines (differentiating infected from vaccinated animals), address this differentiation problem. Examples include subunit vaccines, recombinant vectored vaccines and DNA vaccines. Through different technologies, each of these formulations is stripped down to contain only the elements that induce a protective immune response.

Subunit vaccines are developed by inserting only the immunogenic proteins from the surface of a bacterium or virus into a plasmid (e.g. yeast). These proteins are then harvested and developed into a vaccine. Selecting only the proteins that will induce a protective immune response makes subunit vaccines safer by leaving out substances that may produce adverse side effects.

Viruslike particle (VLP) vaccines, such as the porcine circovirus type 2 vaccine, are subunit vaccines comprised of viral structural proteins that can self-assemble into VLPs. Also called nanoparticle vaccines, VLP vaccines can stimulate CMI and antibody responses.

Because subunit vaccines present only the relevant antigens to the immune system, they tend to induce a stronger immune response. They can also increase the immunogenicity of native proteins. These vaccines, Dr. Gershwin noted, are more likely to elicit an antibody response than CMI. An adjuvant is typically required to ensure long-term immunity.

Recombinant vectored vaccines, such as the rinderpest vaccine, use a viral or bacterial vector to produce proteins that will generate a protective immune response. Poxviruses have been a popular viral vector, given their large genome.

To develop a recombinant viral vector vaccine, for example, the pox-related genetic material is removed, and the genes that code for the selected protective proteins are inserted. After the viral vector is injected into the patient, the vector will undergo limited intracellular replication, express the genes and subsequently induce CMI and antibody responses.

Recombinant vectored vaccines, Dr. Gershwin explained, have all of the advantages of MLV and subunit vaccines.

DNA vaccines, such as the canine melanoma vaccine, have shown at least initial promise in veterinary vaccinology. They are made by inserting the DNA sequence that codes for protective proteins into a plasmid.

DNA vaccines are placed within a liposome and injected intramuscularly with a specialized injector. They typically produce strong CMI.

The canine melanoma vaccine is made by inserting the human tyrosinase gene into the plasmid. Tyrosinase is overexpressed in animal and human melanoma cells. In theory, using the human tyrosinase gene “will stimulate an immune response against the animal’s melanocytes,” Dr. Gershwin said. Unfortunately, the vaccine may not be very effective in dogs because dogs with melanoma are usually quite sick by the time the vaccine is given.

Bringing it together

Beyond MLVs and killed vaccines, the new vaccine formulations hold promise for providing adequate protection against infectious diseases in veterinary patients. Deciding which formulation to use will depend on the desired type of immune response. **dvm360**

Dr. JoAnna Pendergrass received her DVM from the Virginia-Maryland College of Veterinary Medicine. Following veterinary school, she completed a postdoctoral fellowship at Emory University’s Yerkes National Primate Research Center. Dr. Pendergrass is the founder and owner of JPen Communications, a medical communications company.

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Managing recurrent UTIs in pets

Internist and Fetch dvm360 conference speaker Dr. Michael Wood offers practical insights into this frustrating veterinary condition. *By Kristi Reimer Fender*

When it comes to urinary tract infections (UTIs) in pets, the good news is that most dogs with simple uncomplicated UTIs will recover from the episode and go on to live a happy, healthy life, says Michael Wood, DVM, PhD, DACVIM (SAIM), of the University of Wisconsin-Madison School of Veterinary Medicine. The not-so-good news? About 25% of pets that develop a UTI in their lifetime will experience recurrence.

Recurrent infections are a problem for a couple of major reasons, Dr. Wood says: One, how do you manage your patient in a way that minimizes antibiotic resistance, both in the individual and more broadly in the population? Two, how do you decide whether bacteria in the urine should be treated or not? During a recent Fetch dvm360 conference, Dr. Wood gave attendees some guidance in these areas.

Your basic game plan

Step one when faced with a UTI, Dr. Wood says, is to know your local resistance patterns. “Veterinarians have generally not done a very good job in this area,” Dr. Wood says.

Yes, you can look up published data on antibiotic resistance in veterinary patients, but this data may or may not match what’s happening in your immediate patient population. The best approach is to keep track in your own hospital by recording culture and sensitivity results for every patient, building a database over time. This will help you know which antibiotics are likely to be more effective and less effective in your own patients when an empiric choice is needed. Antibiotics with resistance rates greater than 20% should be used cautiously—if at all—empirically.

Step two is to understand a specific patient’s individual risk factors for resistance. For cats, risk increases with the number of antibiotics used in the last three months

and the number of days the cat has been hospitalized—more days means more likelihood of resistance. In dogs, prior use of antibiotics is a risk factor, especially fluoroquinolones. Dogs are also at higher risk of developing resistance if they’ve been hospitalized for three days or more or if they consume a raw meat diet.

Step three is to perform a urine culture. The challenge, of course, is obtaining the urine sample. While Dr. Wood says cystocentesis will provide the most reliable results, free catch is also acceptable—you just have to interpret the results accordingly. With a free catch urine sample, you need to see more than 100,000 colony-forming units/ml to be confident you have a true infection rather than a contaminated sample.

While you’re waiting for culture and sensitivity results, Dr. Wood says empiric therapy is justified if the patient has had limited previous antibiotic use, if you know the likely pathogen, if you know local susceptibility, and if the patient has clinical signs. According to the International Society for Companion Animal Infectious Diseases (ISCAID), appropriate first-tier empiric antibiotics are amoxicillin, amoxicillin-clavulanate (Clavamox—Zoetis), and trimethoprim-sulfa. But this is where it’s important to know your local resistance rates, Dr. Wood says. Your own first, second and third choices may differ accordingly.

Second-tier antibiotic choices, which should be prescribed based on culture and sensitivity results, are fluoroquinolones, third-generation cephalosporins, and nitrofurantoin; the latter is best for maintaining urine sterility but does have side effects that should be discussed with the owner, Dr. Wood says. He notes that an important exception outlined by ISCAID is pyelonephritis. Here a fluoroquinolone is an appropriate first-line treatment because of its ability to penetrate into kidney tissue where other water-soluble antibiotics are less effective.

What about NSAIDs?

What about nonsteroidal anti-inflammatory drugs (NSAIDs)? ISCAID proposes that these medications may be effective as an antibiotic alternative to treat UTI in veterinary patients based on human studies. The thinking is that they provide the patient relief from clinical signs while the body clears the infection on its own. However, Dr. Wood says, in the human studies, people who use NSAIDs in this manner are shown to experience clinical signs one day longer than those who are treated with antibiotics, and increased rates of pyelonephritis were detected. Given the challenges of diagnosing pyelonephritis in our veterinary patients, Dr. Wood doesn’t use NSAIDs to treat UTI with one exception: if a patient with known recurrent UTIs presents showing clinical signs, NSAIDs can be used as an effective symptom reliever while waiting for culture and sensitivity testing results.

Three kinds of recurrent infections

Dr. Wood explains that recurrent bacteriuria—defined as the detection of bacteria more than three times in a year or twice in six months—falls into one of four categories.

1. Persistent UTI: When a urine culture is positive seven to 10 days after the beginning of treatment, this means bacteria have become resistant, the patient’s immune system is compromised, or the antibiotic cannot achieve a high enough concentration to wipe out the infection either for endogenous or exogenous reasons. All require further investigation to manage the infection appropriately.

2. Relapse: This means the urine is initially cleared of bacteria, but bacterial reservoirs remain, allowing recolonization of the bladder. This condition can be seen in patients with urolithiasis, prostatitis and pyelonephritis and may call for a longer course of treatment, Dr.

Wood says. Another example, though unproven in cats and dogs, is intracellular bacterial communities where bacteria remain quiescent within the urothelium only to proliferate again with the urothelium is turned over.

3. Reinfection: This occurs when the UTI is cleared by an antimicrobial, but abnormal host defenses (for example, low urine-specific gravity) prime the host for another infection. “You can treat each of these infection episodes as an uncomplicated infection with five to seven days of an antibiotic,” Dr. Wood says.

4. Subclinical bacteriuria: More discussion on this below.

Bacteria without signs

Persistence, relapse and reinfection are true UTIs that require treatment if the patient is experiencing clinical signs. But what do you do with subclinical bacteriuria, where you have a positive urine culture but clinical signs are absent?

In people, asymptomatic bacteriuria is rarely treated, Dr. Wood says. In fact, doctors restrict screening of diabetics, people with spinal cord injuries or immunocompromised patients for bacteriuria because they assume it’s there—and it may be protecting the patient from a more virulent organism, Dr. Wood says. ISCAID agrees with this approach, stating that if a veterinary patient is not showing clinical signs, it should not be treated. But Dr. Wood says this is not always practical clinically.

“It depends on how much you trust the owner to recognize subtle clinical signs,” he says. “Are they likely to notice slight changes in frequency, urgency or volume?” Dr. Wood says if he’s confident an owner would pick up on these things in their pet if present, he doesn’t treat subclinical bacteriuria.

However, he warns, “This is by no means a foolproof method and must only be considered with a strong understanding of the patient’s overall health and after discussing the pros and cons of not treating the bacteriuria with owners.” **dvm360**

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*Based on available peer-reviewed published studies.

1. Levy SA. Use of a C6 ELISA test to evaluate the efficacy of a whole-cell bacterin for the prevention of naturally transmitted canine Borrelia burgdorferi. Vet Ther. 2002;3(4):420-424.

2. Elanco Animal Health. Data on file.

3. Chu HJ, Chavez LG Jr, Blumer BM, et al. Immunogenicity and efficacy study of a commercial Borrelia burgdorferi bacteria. J Am Vet Med Assoc. 1992;201(3):403-411.

4. Levy SA, Millership J, Glover S, et al. Confirmation of presence of Borrelia burgdorferi outer surface protein C antigen and production of antibodies to Borrelia burgdorferi outer surface protein C in dogs vaccinated with a whole-cell Borrelia burgdorferi bacterin. Intern J Appl Res Vet Med. 2010;8(3):123-128.

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Dermatology Q&A: 'What's the deal with all this shedding?'

You know shedding is normal, but your clients may not. Here's how to handle concerns about 'excessive' hair loss—and help pet owners recognize when something is truly amiss. *By Darin Dell, DVM, DACVD*

Q: My veterinary clients often complain about “excessive” shedding. How do I politely tell them that shedding is simply a natural part of owning an animal?

A: Dogs have approximately 15,000 hairs per square inch. Cats have between 60,000 and 120,000 hairs per square inch. All of these hairs cycle through the same four stages of development (anagen, catagen, telogen and exogen—just in case you need a refresher), but they aren't all in the same

stage at the same time. Growth happens in a mosaic pattern, so shedding does too, which explains why dogs and cats can shed large numbers of hairs without developing any bald patches.

Shedding is one way an animal can adapt to its environment. Changes in photoperiod and external temperature are the two main factors that determine when major shedding will occur. In North America, this means that outdoor pets are going to shed the most in the spring and fall. However, because most pets now live indoors with a relatively

consistent temperature and photoperiod, the result is near-constant shedding.

However, any time our clients are concerned, we should be concerned. Our clients know their animals better than we do, and if they perceive a change, we need to listen. As objective medical professionals, after we discuss our clients' concerns, it's our job to perform a complete physical exam to check for any abnormalities.

The first step when faced with an exam for “excessive shedding” is to determine if there is obvious alopecia or

true thinning of the coat. Other abnormalities to look for include excoriations, erythema, debris on the skin and poor body condition.

The list of medical problems that can result in alopecia or a thinning hair coat is very long. It's easiest to group the problems into four categories: infectious, hormonal, autoimmune or immune-mediated, and other.

1. Infectious causes include demodicosis, sarcoptic mange, dermatophytosis, *Malassezia* dermatitis and bacterial folliculitis.

2. Hormonal abnormalities that most commonly cause excessive shedding include hypothyroidism, hyperadrenocorticism and alopecia X.

3. Autoimmune or immune-mediated diseases that often cause alopecia include alopecia areata, vasculitis and sebaceous adenitis.

4. Other medical problems that cause hair loss include cutaneous neoplasia, follicular dysplasia, some

forms of ichthyosis, color dilute alopecia and cyclical canine alopecia, which is also called seasonal or cyclical flank alopecia. (Note: This is not an extensive or all-inclusive list).

If you are unable to find any signs of excessive shedding, you can reassure clients by giving them the handout pictured at right, which can be downloaded at dvm360.com/sheddingexplained. It can serve as a handy home reference regarding what's normal and what's not when it comes to shedding and can perhaps spare your client from another unnecessary shedding exam in the future. **dvm360**

Dr. Darin Dell spent six years in general practice and two years in emergency medicine before becoming a diplomate of the American College of Veterinary Dermatology in 2012. He is currently associate medical director at Wheat Ridge Animal Hospital near Denver, Colorado.

FROM YOUR VETERINARIAN

dvm360

Can I stop this shedding?

Every pet sheds. It's a natural process that helps animals adjust to their environment. But how can you tell if your pet sheds a normal amount or way too much? And is there anything you can do about it? Let's shed some light on it.

Hair growth cycle basics

The hair growth cycle has four stages (growth, transition, resting, shedding), and individual hairs go through these stages at different times, resulting in a mosaic pattern of growth and shedding. Because dogs have around 15,000 hairs per square inch and cats have between 60,000 and 120,000 hairs per square inch, normal dogs and cats can shed a large amount of hair (and deposit it all over your clothes and furniture) without developing bald patches.

Several factors affect the hair growth cycle. For example, growth is largely affected by the number of hours of daylight as well as temperature. In North America, dogs and cats living outside will typically shed in the spring and fall because of these factors. But when dogs and cats are kept indoors most of the time (meaning their hours of daylight and temperature stay relatively controlled and consistent), families often have to deal with constant shedding. Hormones, health, nutrition and genetic factors can also affect a dog or cat's hair growth cycle.

2: Nutritional supplements Nutritional supplements usually contain blends of omega fatty acids, vitamins and minerals. Quality pet foods are well balanced, so adding more supplements doesn't typically produce an obvious benefit.

3: Topicals Topical products, including shampoos, sprays and conditioners, are effective at moisturizing the skin, making the hair shinier and making brushing easier. However, they don't actually change shedding. Most of these products are designed to be used along with a de-shedding brush.

More stress = More shedding

The most common reason for more than normal shedding is stress. For some pets, stress involves riding in the car to visit the veterinarian. For other pets, it might be a strange animal in the yard or a new visitor in the house. Of course, there are many important medical conditions, such as hypothyroidism and allergies, that can also cause pets to shed more than normal. It's important to visit your veterinarian when shedding causes patches of missing hair, when the skin appears red or when the shedding is associated with a change in your pet's behavior or activity.

The bottom line when it comes to normal shedding: Keep calm and brush on (and maybe invest in a good vacuum).

What about products promising to stop shedding?

1: Brushes and combs. While brushes and combs specifically designed to strip the coat are useful, they only stop shedding by making you comb the hair out before it falls out.

Source: Darin Dell, DVM, DACVD

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Figure 1. Superficial and deep ulceration in a dog's mouth.

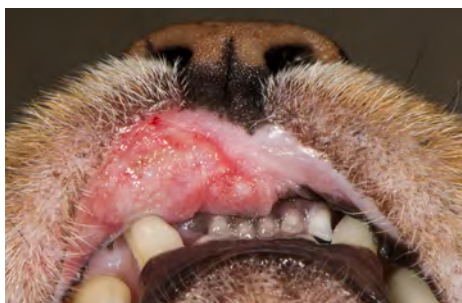


Figure 2A. A rodent ulcer affecting a cat's lip.



Figure 2B. Diffuse ulcerations involving a cat's soft palate and right vestibule.



Figure 2C. Marked oral ulceration involving a dog's left vestibule.



Figure 3A. Marked ulceration on a cat's tongue secondary to calicivirus and feline leukemia virus.



Figure 3B. Vestibular ulceration secondary to squamous cell carcinoma.



Figure 4A. Contact mucositis with ulceration affecting a dog's maxillary canines and incisors.



Figure 4B. Pseudomembrane formation over ulcer secondary to a hypersensitive reaction to plaque.



Figure 4C. Contact ulceration caused by a dachshund's left maxillary first molar.

The ABCs of veterinary dentistry: 'U' is for ulcers—what a pain!

Treating these painful lesions in dogs and cats requires figuring out what's causing them.

By Jan Bellows, DVM, DAVDC, DABVP, FAVD

An ulcer is a tissue defect that has penetrated the border between epithelium and connective tissue. Its base is located deep in the submucosa or even within muscle or bone. An oral ulcer is a break in the mucous membrane with loss of surface tissue and necrosis of epithelial tissue. It is a deeper breach of epithelium than an erosion or excoriation, involving damage to both epithelium and lamina propria (Figure 1).

Oral ulcers in dogs and cats are painful to the patient and often challenging to the veterinarian who has to figure out what to do about them to eliminate suffering.

First things first: Identification

Clients rarely notice their dog's or cat's oral ulcerations. If the lesions were on the tip of their pet's nostrils, they'd be on your office doorstep in a minute. More often it's the veterinarian or technician who finds ulcers either during an exam room check or when the patient is under anesthesia.

The most commonly affected oral tissues include the oral mucosa, the palatal mucosa, the lip margins and the vestibules (areas between the teeth, lips and cheeks) (Figure 2). Some dogs and cats with oral ulcerations show excessive drooling, halitosis and a history of pain when eating. Unfortunately, most do not show any clinical signs, suffering silently. >>



Figure 4D. Contralateral side in the same dog as in Figure 4C where ulceration has eroded through all layers of the mucosa, submucosa and epidermis.

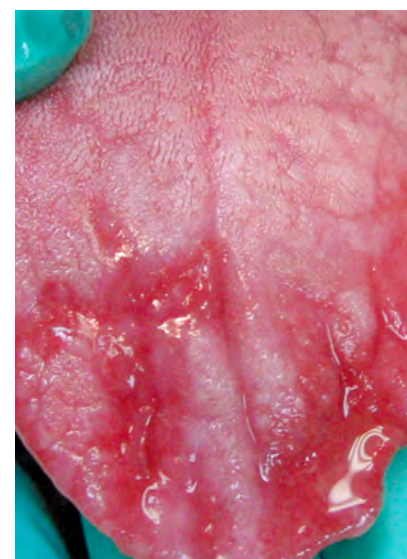


Figure 4E. Ulcers on a dog's tongue after contact with bleach.

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¹ Lavan RP et al. *Parasites & Vectors*. 2017;10:284.

² Lavan RP et al. *Parasites & Vectors*. 2018;11:581.

³ Brakke Consulting. *The US Flea Control and Heartworm Markets*. 2018:6-7.

IMPORTANT SAFETY INFORMATION: The most commonly reported adverse reactions include vomiting, hair loss, itching, diarrhea, lethargy, dry skin, elevated ALT, and hypersalivation. BRAVECTO PLUS has not been shown to be effective for 2 months duration in kittens less than 6 months of age. For topical use only. Avoid oral ingestion. The safety of BRAVECTO PLUS has not been established in breeding, pregnant and lactating cats. Fluralaner is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Neurologic adverse reactions have been reported in cats receiving isoxazoline class drugs, even in cats without a history of neurologic disorders. Use with caution in cats with a history of neurologic disorders. Use with caution in cats that are heartworm positive. The effectiveness of BRAVECTO PLUS to prevent heartworm disease after bathing or water immersion has not been evaluated.



Figure 5A. Marked ulceration secondary to plaque hypersensitivity in a Maltese dog.



Figure 5B. Full-mouth extractions to remove the plaque-laden teeth from contacting sensitive mucous membranes.

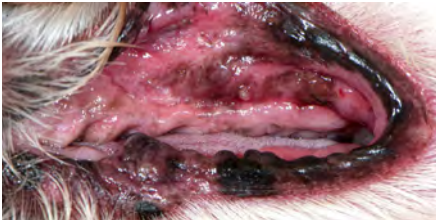


Figure 5C. Resolution of ulceration after full-mouth extraction.

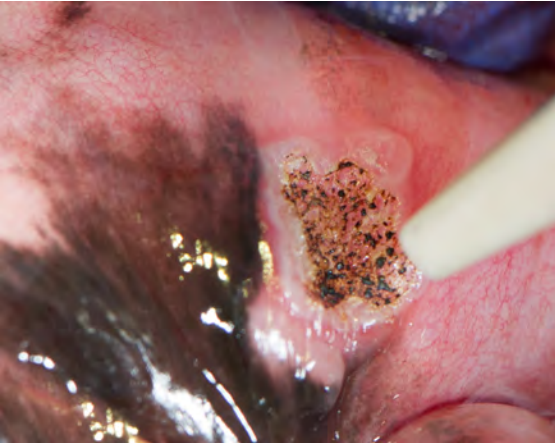


Figure 6A. CO₂ laser treatment of a localized ulcer.



Figure 6B. Refractory caudal ulceration in a cat after full-mouth extraction.



Figure 6C. Laser tissue ablation on the affected side in the patient shown in Figure 6B.



Figure 6D. Tongue ulceration secondary to hair foreign bodies.



Figure 6E. The CO₂ laser used to help treat the ulcers in the patient shown in Figure 6D after hair foreign body removal.



Figure 6F. Appearance of patient shown in Figure 6D one month later at a follow-up laser treatment.



Figure 6G. Laser treatment for resolving ulceration of a cat's tongue (same patient as in Figure 3A).



Figure 6H. Resolution of the rodent ulcer in the patient shown in Figure 2A after systemic steroid treatment and local CO₂ laser tissue ablation.

Next: Discover the proximate cause of the ulcer

Oral ulcers arise from either inside or outside causes.

> **Inside (organic internal medicine) causes.** Internal causes of oral ulcers include viruses, bullous mucocutaneous diseases, azotemia and neoplasia (Figure 3).

> **Outside (other than organic) causes.** Contact ulcers occur secondary to direct mucosal interaction with an irritant, allergen or antigen (Figure 4). Contact mucositis with ulceration is most commonly observed where the labial, buccal or lingual mucosa touches a prominent tooth surface in susceptible dogs or, more rarely, in cats. They have also been referred to as kissing ulcers, kissing lesions and chronic ulcerative paradental stomatitis (CUPS) lesions.

Treatment

Ulcers are wounds. Their persistence depends on their etiology and the animal's ability to self-repair. Treatment of oral ulcers involves eliminating the cause, allowing re-epithelialization to occur. Topical medicaments with zinc ascorbate and zinc gluconate (such as Maxi/Guard Oral Cleansing Gel—Addison Biological Laboratory) help stimulate collagen production, which is part of the healing process. The antimicrobial properties of zinc ascorbate help control infection. Other therapies include tooth extraction to eliminate mechanical irritation, short-term use of systemic anti-inflammatories and antimicrobials, and CO₂ laser.

In cases of ulcers caused by plaque-laden tooth contact with the alveolar mucosa (Figure 5A), initial treatment involves dental scaling and polishing followed by scrupulous home care administered twice daily. Daily application of OraVet Plaque Prevention Gel (Boehringer Ingelheim) is advised to create a barrier between the tooth and mucosa. Unfortunately, this does not usually eliminate the ulcers, necessitating extraction of teeth (Figures 5B, 5C).

The use of a CO₂ laser to photovaporize oral ulcers has met with favorable results. The process decreases pain and the bacterial load, leaving a “Band-Aid” char covering exposed tissue (Figure 6). The laser is set between 3 and 6 watts in continuous mode, and the ulcer is slowly circumscribed by gradually focusing on the lesion until the entire ulcer is “painted” with light energy. [dvm360](http://dvm360.com)

Dr. Jan Bellows owns All Pets Dental in Weston, Florida. He is a diplomate of the American Veterinary Dental College and the American Board of Veterinary Practitioners. He can be reached at dentalvet@aol.com.



(fluralaner and moxidectin topical solution) for Cats

Caution:
Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

Description:
Each tube is formulated to provide a minimum dose of 18.2 mg/lb (40 mg/kg) fluralaner and 0.9 mg/lb (2 mg/kg) moxidectin. Each milliliter contains 280 mg of fluralaner and 14 mg of moxidectin.

The chemical name of fluralaner is (±)-4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydroisoxazol-3-yl]-2-methyl-N-[2-oxo-2-(2,2,2-trifluoroethylamino)ethyl]benzamide. The chemical name of moxidectin is (2aE,4E,5'R,6R,6'S,8E,11R,13S,15S,17aR,20R,20aR,20bS)-6'-[([E]-1,3-Dimethyl-1-butenyl)-5',6,6',7,10,11,14,15,17a,20,20a,20b-dodecahydro-20,20b-dihydroxy-5',6,8,19-tetramethylspiro[11,15-methano-2H,13H,17H-furo[4,3,2-pg][2,6]benzodioxacyclooctadecin-13,2'-[2H]pyran]-4',17(3'H)-dione 4'-[E)-(O-methyloxime). Inactive ingredients: dimethylacetamide, glycofuroil, diethyltoluamide, acetone, butylhydroxytoluene

Indications:
Bravecto Plus is indicated for the prevention of heartworm disease caused by *Dirofilaria immitis* and for the treatment of infections with intestinal roundworm (*Toxocara cati*; 4th stage larvae, immature adults and adults) and hookworm (*Ancylostoma tubaeforme*; 4th stage larvae, immature adults and adults). Bravecto Plus kills adult fleas and is indicated for the treatment and prevention of flea infestations (*Ctenocephalides felis*) and the treatment and control of tick infestations [*Ixodes scapularis* (black-legged tick) and *Dermacentor variabilis* (American dog tick)] for 2 months in cats and kittens 6 months of age and older and weighing 2.6 lb or greater.

Dosage and Administration:
Bravecto Plus should be administered topically as a single dose every 2 months according to the **Dosage Schedule** below to provide a minimum dose of 18.2 mg/lb (40 mg/kg) fluralaner and 0.9 mg/lb (2 mg/kg) moxidectin.

For prevention of heartworm disease, Bravecto Plus should be administered at 2-month intervals. Bravecto Plus may be administered year-round without interruption or at a minimum should be administered at 2-month intervals beginning at the cat's first seasonal exposure to mosquitoes and continuing until the cat's last seasonal exposure to mosquitoes. If a dose is missed and a 2-month interval between doses is exceeded, administer Bravecto Plus immediately and resume the dosing every 2 months.

When replacing a monthly heartworm preventative product, the first dose of Bravecto Plus should be given within one month of the last dose of the former medication.

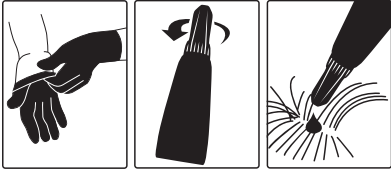
Dosing Schedule:

Body Weight Ranges (lb)	Fluralaner content (mg/tube)	Moxidectin content (mg/tube)	Tubes Administered
2.6 – 6.2	112.5	5.6	One
>6.2 – 13.8	250	12.5	One
>13.8 – 27.5*	500	25	One

* Cats over 27.5 lb should be administered the appropriate combination of tubes.

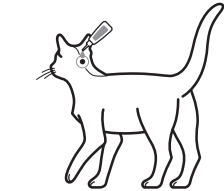
A veterinarian or veterinary technician should demonstrate or instruct the pet owner regarding the appropriate technique for applying Bravecto Plus topically to cats prior to first use.

Step 1: Immediately before use, open the pouch and remove the tube. Put on gloves. Hold the tube at the crimped end with the cap in an upright position (tip up). The cap should be rotated clockwise or counter clockwise one full turn. The cap is designed to stay on the tube for dosing and should not be removed. The tube is open and ready for application when a breaking of the seal is felt.



Step 2: The cat should be standing or lying with its back horizontal during application. Part the fur at the administration site. Place the tube tip vertically against the skin at the base of the skull of the cat.

Step 3: Squeeze the tube and gently apply the entire contents of Bravecto Plus directly to the skin at the base of the skull of the cat. Avoid applying an excessive amount of solution that could cause some of the solution to run and drip off of the cat. If a second spot is needed to avoid run off, then apply the second spot slightly behind the first spot.



Greasy, oily, or wet appearance may occur at the application site in some cats.

Contraindications:
There are no known contraindications for the use of the product.

WARNINGS:

Human Warnings:
Not for human use. Keep this and all drugs out of the reach of children.

Do not contact or allow children to contact the application site until 2 hours post application.

Keep the product in the original packaging until use in order to prevent children from getting direct access to the product. Do not eat, drink or smoke while handling the product. Avoid contact with skin and eyes. If contact with eyes occurs, then flush eyes slowly and gently with water. **If wearing contact lenses, eyes should be rinsed first, then remove contact lenses and continue rinsing, then seek medical advice immediately. Wash hands and contacted skin thoroughly with soap and water immediately after use of the product. If the product accidentally contacts skin and a sticky residue persists after washing, rubbing alcohol (70% isopropyl alcohol) can be applied to the area to remove the residue.**

The product is highly flammable. Keep away from heat, sparks, open flame or other sources of ignition.

Precautions:
For topical use only. Avoid oral ingestion (see **Animal Safety**).

Fluralaner, one of the ingredients in Bravecto Plus, is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Neurologic adverse reactions have been reported in cats receiving isoxazoline class drugs, even in cats without a history of neurologic disorders. Use with caution in cats with a history of neurologic disorders.

Use with caution in cats that are heartworm positive (see **Animal Safety**).

Bravecto Plus has not been shown to be effective in kittens less than 6 months of age.

The safety of Bravecto Plus has not been established in breeding, pregnant, and lactating cats.

The effectiveness of Bravecto Plus to prevent heartworm disease after bathing or water immersion has not been evaluated.

Adverse Reactions:
In a well-controlled U.S. field study, which included a total of 176 treated cats (135 with Bravecto Plus and 41 with a monthly topical active control), there were no serious adverse reactions.

Percentage of Cats with Adverse Reactions (AR) in the Field Study

Adverse Reaction	Bravecto Plus Group: Percent of Cats with the AR During the 120-Day Study (n=135 cats)	Active Control Group: Percent of Cats with the AR During the 120-Day Study (n=41 cats)
Vomiting	5.9%	12.2%
Alopecia (not at application site)	5.2%	2.4%
Pruritus	4.4%	12.2%
Application site pruritus	4.4%	4.9%
Diarrhea	3.7%	7.3%
Lethargy	3.7%	9.8%
Dry Skin	3.0%	0.0%
Elevated alanine aminotransferase (ALT)*	3.0%	0.0%
Hypersalivation	1.5%	1.5%
Application site alopecia	0.7%	0.0%

*ALT was greater than twice the upper reference range of 100 IU/L. These cats also had mild elevations of aspartate aminotransferase (AST) (less than twice the upper reference range of 100 IU/L). No clinical signs associated with liver disease were noted in these cats.

In well-controlled laboratory effectiveness studies, the following adverse reactions were seen after application of Bravecto Plus: pyrexia, tachypnea, mydriasis, pruritus, scabbing, and bloody stool.

Foreign Market Experience: The following adverse events were reported voluntarily during post-approval use of the product in cats in foreign markets: polydipsia, swelling of chin and lips, periorbital swelling, blepharospasm, pruritus, erythema, aggression, agitation, pyrexia, mydriasis, hypersalivation, hyperactivity, alopecia, and excessive grooming. These adverse events occurred within 48 hours of administration.

In a European field study for fluralaner topical solution for cats, there were three reports of facial dermatitis in humans after close contact with the application site which occurred within 4 days of application. In foreign market experience reports for Bravecto Plus, one veterinarian experienced tingling and numbness of the fingers, hand, and arm, and swelling of the hand and arm after getting Bravecto Plus on her fingers. Additional signs, including blurred vision and disorientation, occurred after taking an antihistamine.

To report suspected adverse events, for technical assistance or to obtain a copy of the Safety Data Sheet (SDS), contact Merck Animal Health at 1-800-224-5318. Additional information can be found at www.bravecto.com. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at <http://www.fda.gov/reportanimalae>.

Clinical Pharmacology:
Peak fluralaner concentrations are achieved between 3 and 21 days following topical administration and the elimination half-life ranges between 11 and 18 days. Peak moxidectin concentrations are achieved between 1 and 5 days following topical administration and the elimination half-life ranges between 20 and 30 days.

Mode of Action:
Fluralaner is for systemic use and belongs to the class of isoxazoline-substituted benzamide derivatives. Fluralaner is an inhibitor of the arthropod nervous system. The mode of action of fluralaner is the antagonism of the ligand-gated chloride channels (gamma-aminobutyric acid (GABA)-receptor and glutamate-receptor).

Moxidectin is for systemic use and is a semisynthetic derivative of nemadectin, belonging to the milbemycin group of macrocyclic lactones. It binds to gamma-aminobutyric acid (GABA) and glutamate-gated chloride channels of the nerves and muscles of the parasite resulting in hyperpolarization, paralysis and death.

Effectiveness:
In two well-controlled laboratory studies, Bravecto Plus was 100% effective against induced heartworm infections when administered 2 months prior to infection. Bravecto Plus was not effective when administered more than 2 months prior to infection.

In well-controlled laboratory studies, Bravecto Plus was effective against naturally and experimentally induced adult and experimentally induced 4th stage larval and immature adult *Toxocara cati* and *Ancylostoma tubaeforme* infections in cats.

In a well-controlled laboratory study, Bravecto Plus killed 100% of fleas within 12 hours after treatment and reduced the numbers of live fleas on cats by >99% within 12 hours after treatment or infestation for 2 months. In well-controlled laboratory studies, Bravecto Plus demonstrated >90% effectiveness against *Dermacentor variabilis* 48 hours after treatment or infestation for 2 months but failed to demonstrate ≥ 90% effectiveness beyond 2 months. In well-controlled laboratory studies, Bravecto Plus demonstrated ≥ 98.1% effectiveness against *Ixodes scapularis* 48 hours after treatment or infestation for 2 months.

Animal Safety:
Margin of Safety Study: In a margin of safety study, Bravecto Plus was administered topically to 9- to 13-week-old (mean age 12 weeks) kittens at 1X, 3X, and 5X the maximum labeled dose of 93.0 mg fluralaner/kg and 4.7 mg moxidectin/kg at three, 8-week intervals (10 kittens per group). The kittens in the control group (0X) were treated with mineral oil. There were no clinically-relevant, treatment-related effects on physical examination, body weights, food consumption, clinical pathology (hematology, clinical chemistries, coagulation tests, serum amyloid A, and urinalysis), gross pathology, histopathology, or organ weights. Single incidences of self-limiting hypersalivation in three kittens (one kitten in the 1X group and two kittens in the 3X group) and pruritus at the administration site in one kitten in the 3X group were observed on the day of dose administration. Cosmetic changes at the application site included matting/clumping/spiking of hair, wetness, or a greasy appearance.

Oral Safety Studies: In an oral safety study, one dose of Bravecto Plus was administered orally to 4- to 9-month-old kittens at the maximum labeled dose of 93.0 mg fluralaner/kg and 4.7 mg moxidectin/kg. The kittens in the control group were administered saline orally. There were no clinically-relevant, treatment-related effects on physical examination, body weights, food consumption, or clinical pathology (hematology, clinical chemistries, coagulation tests, serum amyloid A, and urinalysis). Five of six treated kittens experienced hypersalivation. One treated kitten experienced vomiting 2 hours after administration and another 8 hours after treatment. Treated kittens had reduced food consumption on the day of treatment.

In an oral safety study for fluralaner topical solution for cats, four out of six cats experienced coughing immediately after oral administration of the maximum labeled dose of 93.0 mg fluralaner/kg.

In a pilot oral safety study, adult cats orally administered 0.5X or 1X the maximum labeled dose of Bravecto Plus had foaming hypersalivation for up to five minutes and reduced food consumption on the day of dosing. One cat exhibited transient lacrimation from one eye during the first 15 minutes after dosing.

Safety in cats infected with adult heartworm (Dirofilaria immitis): Bravecto Plus was administered topically to cats infected with adult heartworm at 1X or 3X the maximum labeled dose of 93.0 mg fluralaner/kg and 4.7 mg moxidectin/kg (8 cats per group). The cats in the control group (0X) received mineral oil topically. Two untreated cats were found dead prior to dosing. There were no clinically-relevant, treatment-related effects on body weights, clinical pathology (hematology, clinical chemistry, and coagulation profile), gross pathology or histopathology. Self-limiting hypersalivation due to grooming was observed on the day of treatment in both treatment groups (6/8 cats in the 1X group and 7/8 cats in the 3X group). In addition, three treated cats (2/8 cats in the 1X group and 1/8 cats in the 3X group) developed adverse neurologic signs during the study and were euthanized due to quality-of-life concerns. Clinical signs in one cat in the 1X group included vomiting, depression, vocalization, and ataxia 38 days that included ataxia, paresis, and muscle tremors 25 days after dosing. A cat in the 3X group exhibited depression, dehydration, a hunched position, and inability to stand 22 days after dosing. Heartworms were found in the epidural space in the second cat of the 1X group and the cat in the 3X group.

Field Safety Study: In a well-controlled field study, Bravecto Plus was used concurrently with other medications, such as vaccines, anthelmintics, antibiotics and steroids. No adverse reactions were observed from the concurrent use of Bravecto Plus with other medications.

Storage Conditions:
Do not store above 77°F (25°C). Store in the original package in order to protect from moisture. The pouch should only be opened immediately prior to use.

How Supplied:
Bravecto Plus is available in three tube sizes to treat cats ranging in weight from 2.6 lb – 27.5 lb (1.2 kg to 12.5 kg). Each tube is packaged individually in a pouch. Product may be supplied in 1 or 2 tubes per carton.

Approved by FDA under NADA # 141-518

Rev: 08/2019



products

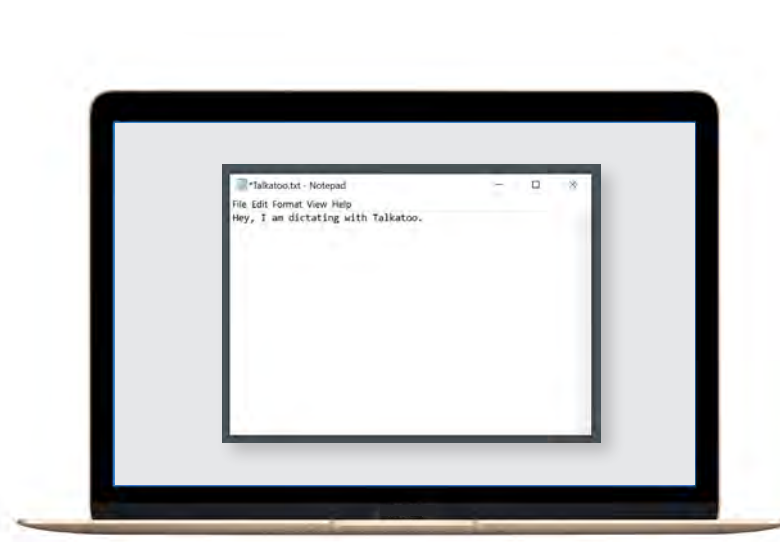


BUTTERFLY NETWORK

Handheld ultrasound device

The Butterfly iQ Vet is a handheld ultrasound device bringing ultrasound-on-a-chip technology to veterinarians. Butterfly iQ Vet has already impacted the healthcare of animals both large and small in unique locations around the world. From scanning manta rays underwater to sea turtles on beaches to pets on the exam table, its portability and reliability provide veterinarians the ability to make timely, precise diagnoses. The eventual goal of Butterfly iQ Vet is to put the device in the hands of consumers, giving pet owners a direct window into their animal's health to better understand and care for their pets in a reliable, cost-effective manner.

For more information visit butterflynetwork.com/vet/overview.



TALKATOO

Speech-to-text software

Talkatoo is reinventing speech-to-text software by making it cross-platform and easier to use, saving its customers (busy professionals such as doctors, veterinarians and lawyers) time so they can get more done. Talkatoo works in any text field just like a keyboard; wherever you would type, you can talk instead. It can be used in practice management software systems, Microsoft Office, Google Docs and on the web. Talkatoo cuts clinic documentation time in half. The output is highly accurate so users spend less time correcting their notes. The product includes a robust veterinary vocabulary.

For more information visit talkatoo.com.



ANIMALBIOME

Gut restoration supplements

AnimalBiome uses the latest microbiome science to improve the health of dogs and cats. The company provides diagnostics and therapeutics to help veterinarians address chronic health conditions related to imbalances in the gut microbiome. AnimalBiome has the world's first stool bank for dogs and cats that is rigorously screened for pathogens, parasites and microbiome composition. In addition to offering gut health microbiome tests for pets, AnimalBiome has created gut restoration supplements that are delivered orally to treat symptoms like vomiting and diarrhea in cats and dogs.

For more information visit animalbiome.com.



KINDREDBIO

Fever-control injectable for horses

Kindred Biosciences recently announced that the FDA has approved Zimeta (dipyrone injection) for the control of pyrexia in horses. Pyrexia, or fever, is associated with a number of underlying diseases and can result in significant negative outcomes, including dehydration, laminitis, muscle wasting, weight loss and, in some, cases death. Among performance horses, fever can also lead to loss of training and competition days. Zimeta, which is classified as a nonsteroidal anti-inflammatory drug, targets fever centrally in the brain, where it originates. In a clinical study, Zimeta demonstrated rapid and effective fever reduction in horses with naturally occurring fever. Zimeta is administered intravenously at 30 mg/kg once or twice daily, at 12-hour intervals, for up to three days.

For more information visit kindredbio.com/zimeta.

Innovative ways to increase profit in your practice

Study shows 500%+ returns when practices add communication software that allows pet owners to stay current and pet care providers to stay connected.

Explosive growth in the pet sector, drastic shifts in client demographics and desires, and a quickly changing landscape of corporate consolidation have led to increasingly intense competition among veterinary practices throughout the country. In the face of escalating pressure to deliver against the rising expectations of clients and staff alike, practices must look beyond traditional business solutions to drive measurable results. Practices that can't compete on volume—and often lose out in the hiring wars—must find other ways to generate enough revenue to grow their business while also providing a “white-glove” healthcare experience for their patients and clients.

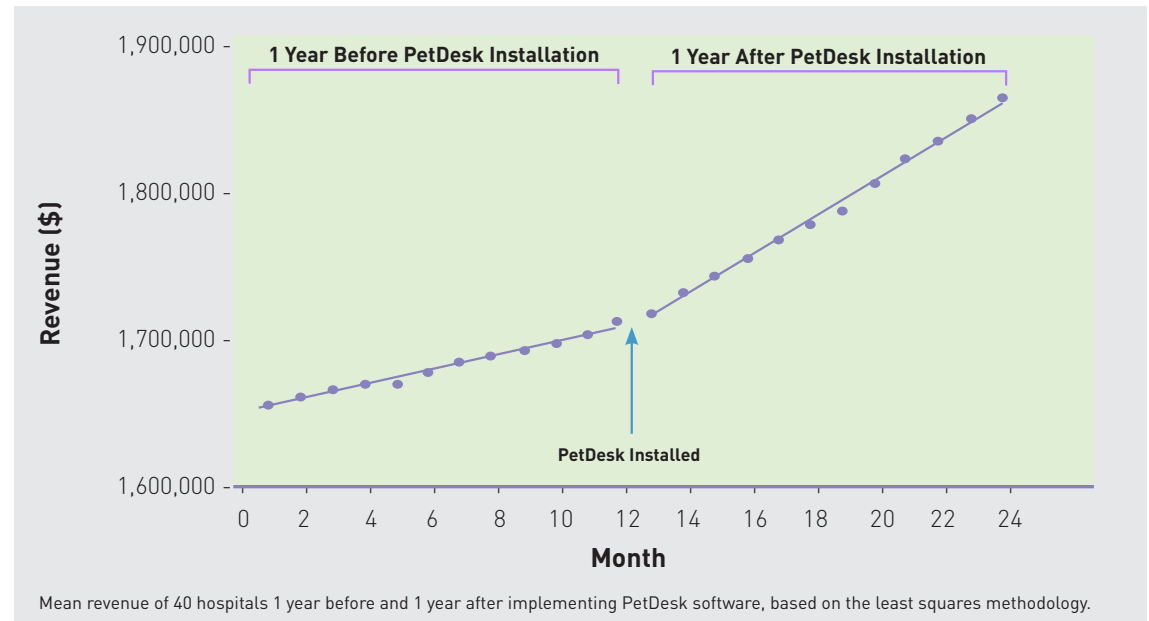
There are two avenues through which clinics can increase profit: by cutting costs or by growing revenue. Although the traditional approach of cost cutting does drive profitability in the short term, for a variety of reasons it is unlikely to lead to long-term, resilient profitability that will give the practice a true competitive advantage. At the end of the day, it's revenue growth that allows businesses to achieve higher levels of profitability, and revenue growth today is best achieved through value innovation.

CONVENTIONAL LOGIC VS VALUE INNOVATION

Although many veterinary practice owners believe that revenue growth is best achieved by adding new services or raising prices, these may not always be the best routes to take. In fact, the conventional approach of continually increasing costs without adding value for your customers may price your practice right out of the competition. Likewise, adding new services such as boarding, grooming or acupuncture can be helpful, but they require training, workflow changes, capital expenditures and/or additional employees, all of which diminish the likelihood of success of the new service.

Veterinary practices that employ conventional logic—a reactive approach—are only able to compete for an incremental share of profits. Value innovators, on the other hand, are proactive, planning from the outset to dominate the market by focusing their efforts on what customers truly value. In the case of veterinary medicine, that's convenience, efficiency, and excellent care.

The key is to create a product offering that does not simply increase pricing but instead benefits clients through value innovation—providing cutting-edge



services that create a better client experience and capitalize on the human-animal bond *without* having to decrease prices to match the competition.

To add value to the client experience without compromising the core activities of the clinic, an innovative solution must:

- Be easy to set up with minimal changes to workflow
- Add value for the current customer base
- Aim for revenue growth rather than merely cost reduction
- Provide a point of differentiation for the practice

Not surprisingly, app- and cloud-based technologies that connect pet owners with veterinarians online and afford easier access to pet health information are among the smartest investments a veterinary practice can make. By partnering with an established company that can help you provide convenient, always-on services that are easy to implement, a practice can grow revenue without the need for additional capital expenditures associated with other services.

INVESTING IN TECHNOLOGY TO GROW YOUR BUSINESS

Practices that are considering adding a value innovation service would do well to consider PetDesk. This industry-leading platform streamlines communication between veterinary practices and their clients while maintaining a personal touch, thus improving engagement, increasing visits and bolstering satisfaction among both patrons and employees. Simply put, PetDesk helps pet owners stay current and pet care providers

stay connected through a combination of tools, including appointment requests, reminders and confirmations; a mobile app; two-way messaging; loyalty programs; and online reviews. With PetDesk, team members spend less time on the phone and more time helping the people and pets coming into your facility.

To determine the value of PetDesk software innovation, Aaron D. Wallace MS, MBA, DVM, Julia Labadie, MSPH, PhD, DVM, and Aaron Massecar, MA, PhD, conducted a comparative analysis of revenue generated 12 months before and 12 months after implementing PetDesk software in 40 practices across the country. Practices ranged in size and location, with an average of 3.45 full-time veterinarians in each clinic.

The results? Practices that implemented PetDesk software demonstrated an average incremental revenue growth of nearly 5%, not counting organic revenue increases. Furthermore, PetDesk practices boasted a 557% return on their investment.

In a white paper analyzing this study, Drs. Wallace, Labadie, and Massecar concluded that “...based on the data provided on the hospitals in this study there is a correlation to revenue growth, and a positive ROI should be expected with a PetDesk implementation.”

For more information about the details of this study—and what PetDesk can offer your business—check out the full results at PetDesk.com/growth-study. ■

REFERENCE

1. Blue Ocean strategy & shift tools. Blue Ocean website. blueoceanstrategy.com/tools/value-innovation/. Accessed December 19, 2019.



For a full listing of events in 2019, visit dvm360.com/calendar



April 2-5, 2020
Fetch dvm360
in Baltimore
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August 28-31, 2020
Fetch dvm360
in Kansas City
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December 11-14
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in San Diego
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Here are the CE opportunities coming in the next few months

January 9-12 VHMA Leadership through Partnership Chicago, IL (518) 433-8911 ext. 2 vhma.org/events	January 27-29 VetVacationCE Internal Medicine and Anesthesia Newport, Curacao (888) 488-3882 vetvacationce.com	February 13- November 21 Veterinary Management Institute Fort Collins, CO 720-963-4424 aaha.org	March 15 It's What's Up Front That Counts! Long Beach, CA (303) 674-8169 vmc-inc.com	San Antonio, TX lonestarovetacademy.com
January 10 It's What's Up Front that Counts! Tucson, AZ (303) 674-8169 vmc-inc.com	January 28 VHMA Regional Workshop Houston, TX (518) 433-8911 ext. 2 vhma.org/events	February 16-19 Western Veterinary Conference (WVC) Las Vegas, NV (866) 800-7326 wvc.org/conference	March 23-25 VetVacationCE Cardiol- ogy and Oncology Whistler, BC (888) 488-3882 vetvacationce.com	April 25-26 San Diego VMA Spring Conference: Endo- crinology for the General Practitioner San Diego, CA (619) 640-9583 sdcvma.org
January 10-12 Fundamentals of Dentistry Baltimore, MD (410) 828-5005 AnimalDental Training.com	February 1-8 Veterinary Orthopedic Society's 47th Annual Meeting Sun Valley, ID secretary@ vosdvm.org	February 20-23 Midwest Veterinary Con- ference Columbus, OH (614) 436-1300 mvcinfo.org	March 26-28 VetVacationCE Derma- tology and Dentistry Austin, TX (888) 488-3882 vetvacationce.com	April 30 VHMA Regional Workshop Mahwah, NJ (518) 433-8911 ext. 2 vhma.org/events
January 18 Veterinary Meeting and Expo (VMX) Orlando, FL (352) 375-5672 navc.com/vmx	February 7-9 Oral Surgery 1+2, Oral Pathology, and Radiology Towson, MD (410) 828-5005 AnimalDental Training.com	February 27 VHMA Management Exchange Charleston, SC (518) 433-8911 ext. 2 vhma.org/events	April 2-5 Fetch dvm360 conference Baltimore, MD (800) 255-6864 ext. 6 fetchdvm360.com	June 12-13 France Vet: The Veteri- nary Rendezvous Incon- tournable Paris, France +33 (1) 78 90 03 95 france.vetshow.com
January 25 Canine Extractions Techniques Boise, ID (360) 309-4951 veterinaryeducation team.com	February 10-12 VetVacationCE Ophthalmology and Sur- gical Oncology Paradise Island, Bahamas (888) 488-3882 vetvacationce.com	February 28-March 1 American Laser Study Club 2020 Symposium Delray Beach, FL (888) 206-2710 americanlaserstudy club.org/symposium	April 17-19 American Academy of Veterinary Acupuncture Annual Meeting Memphis, TN (931) 438-0238 aava.org	June 17 VHMA Regional Workshop Seattle, WA (518) 433-8911 ext. 2 vhma.org/events
January 26 CVMA SkICE Orlando, FL (303) 318-0447 colovma.org/skice		February 28-March 1 Music City Veterinary Conference Murfreesboro, TN (931) 438-0070 tvmanet.com	April 25-26 Emergency/Critical Care: A Review of Toxicology, Anesthesia, and Infectious Disease	June 21-24 Pacific Veterinary Conference Long Beach, CA (800) 655-2862 pacvet.net

dvm360® (Print ISSN: 2326-0688, Digital ISSN: 2326-070X) is published monthly by MultiMedia Healthcare, LLC, 230 W Superior ST, Ste 400 Duluth MN 55802. Subscription rates: \$40 for one year in the United States & Possessions, Canada and Mexico; all other countries \$87.50. Single copies (prepaid only): \$18 in the United States; \$20 in Canada and Mexico; \$24 all other countries. Back issues, if available: U.S. \$23; Canada/Mexico \$28; all other countries \$46. International pricing includes air-expedited service. Include \$6.50 per order plus \$2 per additional copy for U.S. postage and handling. Periodicals postage paid at Duluth MN 55806 and additional mailing offices. POSTMASTER: Please send address changes to dvm360, PO Box 457, Cranbury NJ 08512-0457 Attn: Publications Mail Printed in the U.S.A.

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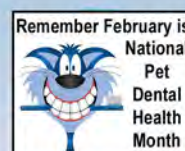


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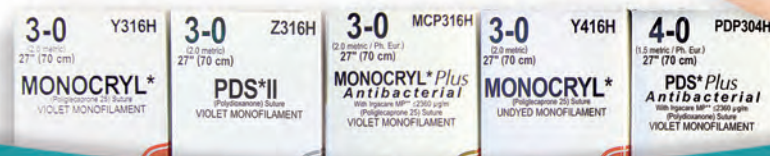
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A DVM at the DMV

You stand in a lot of lines as a veterinarian rushing between appointments to get a driver's license renewed at the Department of Motor Vehicles.

Time is something busy veterinarians don't have enough of. This is especially true when things have to be done during business hours—like getting your driver's license renewed.

My good friend Audie told me that when he'd gone to get his license renewed, he needed his birth certificate. I paid close attention to his instructions, because I knew my license was up soon, too, and I was planning to go in prepared.

It was a Monday, and my 1 p.m. appointment canceled. This was just what I'd been waiting for. My original birth certificate was tucked away nice and flat in a Ziploc bag in my pickup, and I was headed out to the Department of Motor Vehicles (DMV). The clock on my dashboard read 11:54 when I pulled out of the clinic.

At the DMV, I was met with a line of about 12 people. I got in line (No. 1) feeling proud of myself for knowing about the secret birth certificate requirement. Audie had also told me I needed my social security card, so I had that on hand too.

Sure enough, the lady at the front of the line exclaimed that she'd never needed her birth certificate before. She stomped out. Eight more people eventually left with the same foul expression on their faces as I gloated over my preparedness and was silently thanking Audie for saving me from the same fate.

When my turn came, I approached with a puffed chest and a smile of satisfaction as I plopped my birth certificate and social security card on the counter.

"Have you filled out the form?" asked the lady behind the counter.

"What form?" I asked

"The license renewal form. It's on the east wall."

I left the line, found the form and got to work. There were a few questions and a few boxes to check, and then I was back in line (No. 2).

I watched a few more people stomp out of the room on their quests for birth certificates, and once again I was thanking Audie noiselessly for sparing me that same fate. When my turn finally arrived, I was confident the chore was almost over and I'd even be able to eat and get back to work with time to spare.

"This won't work," said the woman, eyeing my birth certificate.

"Ma'am, that's the original," I told her. "It even has my footprints on it. I'm not sure how you can get a better birth certificate than that."

"That's a *hospital* birth certificate," she told me. "We need the one from the courthouse downtown."

I was aggravated at myself for daring to think I could outsmart the system. I drove downtown and found myself in line (No. 3) behind the same people I'd been in line behind earlier. When it was my turn, I told the lady what I needed, and you know what she said?

"Have you filled out the form?"

I went over and found it, but there was no pen. I asked her for one and she handed me the one she was holding.

I filled out the form and got in line (No. 4). When my turn came, she said, "You used the wrong color ink."

"Wait, you gave me that pen."

"I was wondering where I put that," she said. "Sorry, you'll have to fill out the form in black. Sorry, I wasn't thinking."

I filled out another form and got back in line (No. 5). This time everything was correct, and she looked up at me and said, "That'll be \$28."

All I could think was, it was going to cost me \$28 to get a copy of a birth certificate I already had. I gave her my credit card and waited. She and another lady whispered and punched keys on a computer while swiping my card over and over through a reader.

"I'm sorry, but our machine is broken," she said. "You'll need to pay cash today."

Back to my pickup truck to dig through my center console until I came up with the required money.

I got back in line (No. 6) and gave the clerk \$30 cash. She thanked me and she and the other lady soon gathered at the printer and started pushing buttons and whispering.

"I'm sorry, but the printer is out of ink. We have some in the back, but it'll take a few minutes if you'd like to have a seat."

After a trip to the office supply shop across the street to get some ink (there really was none in the back), I was told I could get in line (No. 7) and finally got my document.

Just a few more hoops to jump through, I told myself, as I got back in my truck. I'd be back in time for a little rest before my 2 p.m. arrived.

Back at the DMV, I got in line (No. 8). When my moment came, I gave the woman my documents.

"I also need two forms of identification that have your name and address on them," she said. "You can go home and get a utility bill and bring it back here."

I could feel my blood pressure rising as I stepped out of line for a 30-mile round trip home and figured I'd be late for my 2 p.m. appointment. As I started to walk off, I heard the guy behind me tell her he had a driver's license and a concealed handgun permit. Wait! I have one of those! She said that was great, and I should go to the end of the line (No. 9).

The clock on the dashboard of my pickup read 1:44 as I pulled back into the vet clinic parking lot. I spent the rest of the afternoon being grumpy and wondering why it takes nine trips through a line and nearly two hours to get a new picture of a 4-year-old version of me on a plastic card. **dvm360**

Bo Brock, DVM, owns Brock Veterinary Clinic in Lamesa, Texas. His latest book is Crowded in the Middle of Nowhere: Tales of Humor and Healing From Rural America.

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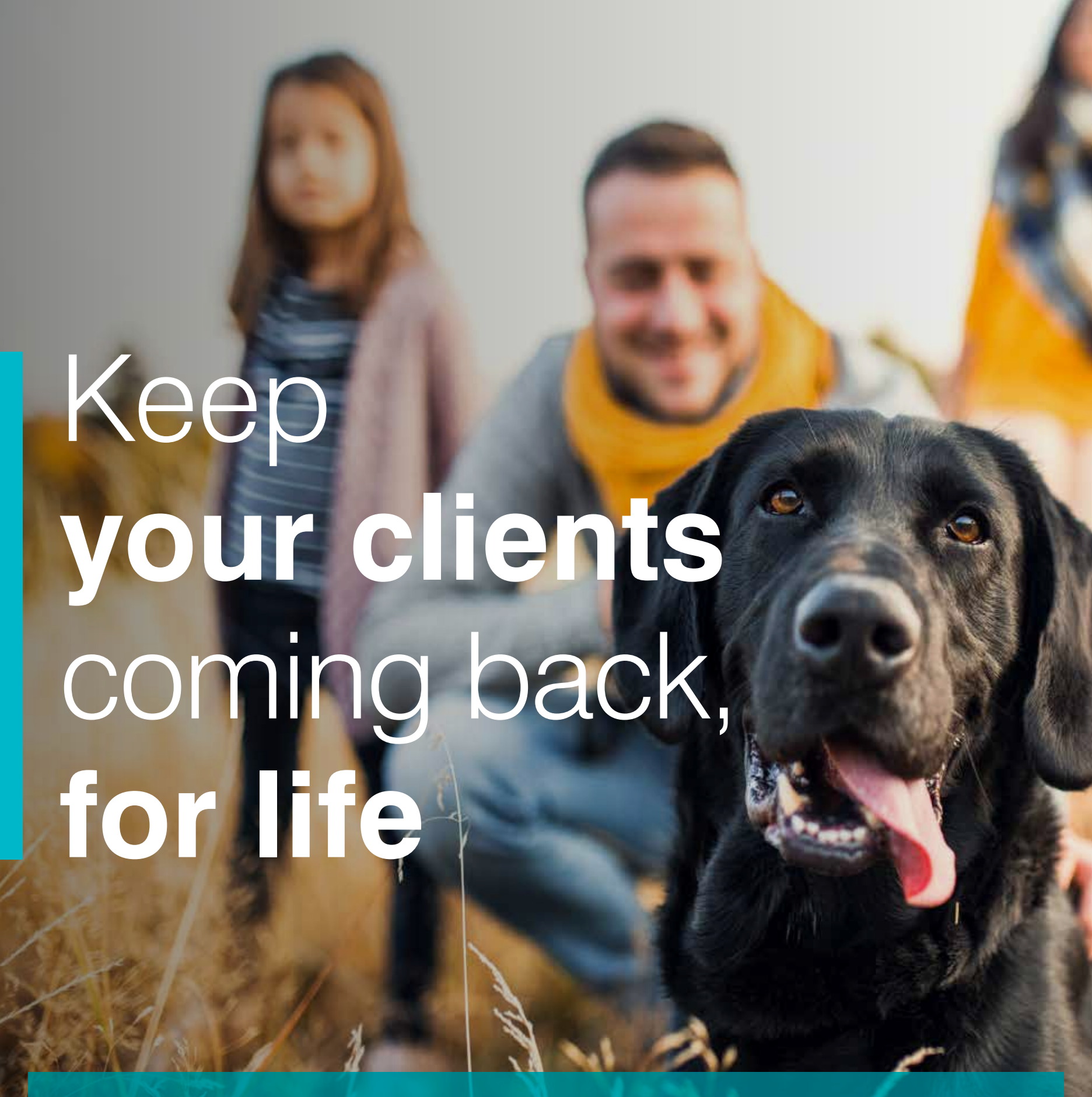
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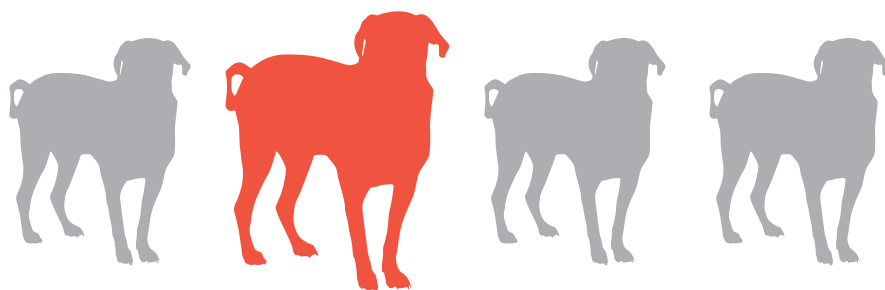
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