Because practice ain't perfect.

TAKING IT EASY
Easy to give, easy to love.

A SAVORY LEGACY
The beef-flavored chew’s enduring appeal.

POWER TO THE PUPPIES*
Monthly protection, assurance as they grow.

TRUSTED PROTECTION IN ONE LITTLE CHEW

NexGard® (afoxolaner) is

223 MILLION STORIES¹
Protection with every dose.

*For puppies 8 weeks of age or older, weighing 4 pounds or more.

1. Data on file at Boehringer Ingelheim.

NexGard® is a registered trademark of the Boehringer Ingelheim Group. All other trademarks are property of their respective owners.

©2020 Boehringer Ingelheim Animal Health USA Inc., Duluth, GA. All rights reserved. US-PET-0202-2020
Prescribe

Powerful protection can also be gentle:

✓ Safe for puppies as young as 8 weeks of age weighing 4 lbs or more
✓ Over 223 million doses of afoxolaner have been prescribed¹
✓ And it’s the only flea and tick control product indicated for the prevention of Borrelia burgdorferi infections as a direct result of killing Ixodes scapularis vector ticks

¹Data on file.

IMPORTANT SAFETY INFORMATION: NexGard is for use in dogs only. The most frequently reported adverse reactions include vomiting, pruritus, lethargy, diarrhea and lack of appetite. The safe use of NexGard in pregnant, breeding, or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures or neurologic disorders. For more information, see the full prescribing information or visit www.NexGardClinic.com.

NexGard® is a registered trademark of the Boehringer Ingelheim Group. ©2020 Boehringer Ingelheim Animal Health USA Inc., Duluth, GA. All rights reserved. US-PET-0060-2020.
Because practice ain't perfect.

Nutritional management of chronic kidney disease

Given the choice, what diet would a pet choose?

The pros and cons of wellness plans

Getting to the root of dental extractions
When treating four-legged patients, make each moment matter.

PNC can help.

We’re making business banking easier.
At PNC, our team of dedicated Healthcare Business Bankers understands your business challenges and the important role that cash flow plays in your success. That's why we offer a range of solutions to help optimize management of your practice's revenue cycle and payables, so your business can run with less complexity and payments can be received promptly.

Learn more at pnc.com/hcprofessionals or by calling 877-566-1355

©2020 The PNC Financial Services Group, Inc. All rights reserved. PNC Bank, National Association. Member FDIC

PNC BANK
Make today the day."
THE GUIDE
April 2020

Winning advice for hospital design

Identifying Chiari-like malformation in dogs

Nutritional management of chronic kidney disease

When surgeons and rehab teams work together

+ Idexx tests for COVID-19

Given the choice, what diet would a pet choose?

The pros and cons of wellness plans

What to know before you buy a veterinary clinic

Tickborne disease surveillance

Image Quiz: Cytology

Punitive training makes dogs pessimistic

Getting to the root of veterinary dental extractions

Quiz: Cytology

Image Quiz: Cytology

Image Quiz: Cytology

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

**Description:**
NexGard® (afoxolaner) is available in four sizes of beef-flavored, soft chewables for oral administration to dogs and puppies according to their weight. Each chewable is formulated to provide a minimum afoxolaner dosage of 1.14 mg/lb (2.5 mg/kg). Afoxolaner has the chemical composition 1-Naphthalenecarboxamide, 4-[5-[(3-chloro-5-(3-fluoromethy1)-phenyl)-4]-5-dihydro-5-(3-fluoromethy1)-3-norazoxanyl]-N-(2-oxo-2-2,3,4-trihydroxyaminomethyl)ethyl.

**Indications:**
NexGard kills adult fleas and is indicated for the treatment and prevention of flea infestations (Ctenocephalides felis), and the treatment and control of Black-legged tick (Ixodes scapularis), American Dog tick (Dermacentor variabilis), Lone Star tick (Amblyomma americanum), and Brown dog tick (Rhipicephalus sanguineus) infestations in dogs and puppies 8 weeks of age and older. Weight 4 pounds of body weight or greater, for one month. NexGard is indicated for the prevention of *Borrelia burgdorferi* infections as a direct result of killing *loxosceles* vector ticks.

**Dosage and Administration:**
NexGard is given orally once a month, at the minimum dosage of 1.14 mg/lb (2.5 mg/kg).

**Dosing Schedule:**

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>Afoxolaner Per Chewable (mg)</th>
<th>Chewables Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8 to 11.1 lbs</td>
<td>6.5</td>
<td>One</td>
</tr>
<tr>
<td>11.1 to 29.8 lbs</td>
<td>20.3</td>
<td>One</td>
</tr>
<tr>
<td>29.8 to 60.0 lbs</td>
<td>88</td>
<td>One</td>
</tr>
<tr>
<td>60.0 to 121.0 lbs</td>
<td>156</td>
<td>One</td>
</tr>
<tr>
<td>Over 121.0 lbs</td>
<td>Administer the appropriate combination of chewables</td>
<td></td>
</tr>
</tbody>
</table>

NexGard can be administered with or without food. Care should be taken that the dog consumes the complete dose, and treated animals should be observed for a few minutes to ensure that part of the dose is not lost or refusen. If it is suspected that any of the dose has been lost or if vomiting occurs within two hours of administration, redose with another full dose. If a dose is missed, administer NexGard and resume a monthly dosing schedule.

**Post-Approval Experience:**

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Afoxolaner</th>
<th>Oral active control</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%) (n=1015)</td>
<td>N (%) (n=200)</td>
<td></td>
</tr>
<tr>
<td><em>Vomiting</em> (with and without blood)</td>
<td>37</td>
<td>17</td>
</tr>
<tr>
<td><em>Diarrhea</em></td>
<td>33</td>
<td>1</td>
</tr>
<tr>
<td><em>Lethargy</em> (with and without blood)</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td><em>Anorexia</em></td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

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

**Warnings:**
Not for use in humans. Keep this and all drugs out of the reach of children. In case of accidental ingestion, contact a physician immediately.

**Precautions:**
Afoxolaner is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Seizures have been reported in dogs receiving isoxazoline class drugs, even in dogs without a history of seizures. Use with caution in dogs with a history of seizures or neurologic disorders (see **Adverse Reactions** and **Post-Approval Experience**).

**Tick Treatment and Prevention:**
Treatment with NexGard may begin at any time of the year. In areas where fleas are common year-round, monthly treatment with NexGard should continue the entire year without interruption.

To minimize the likelihood of flea reinfestation, it is important to treat all animals within a household with an approved flea control product.

**Tick Treatment and Control:**
Treatment with NexGard may begin at any time of the year (see **Effectiveness**).

**Adverse Reactions:**
There are no known adverse events associated with the use of NexGard.

**Contact Information:**
For information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/AnimalVeterinary/SafetyHealth.

**Mode of Action:**
Afoxolaner is a member of the isoxazoline family, shown to bind to a binding site to inhibit insect and arachnid gangliated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), with prolonged pre- and post-synaptic transfer of chloride ions across cell membranes. Prolonged afoxolaner-induced hyperexcitation results in uncontrolled activity of the central nervous system and death of insects and aracnids. The selective toxicity of afoxolaner between insects and scorpions and mammals may be inferred by the differential sensitivity of the insects and aracnids' GABA receptors versus mammalian GABA receptors.

**Effectiveness:**
In a well-controlled laboratory study, NexGard began to kill fleas four hours after initial administration and demonstrated >98% effectiveness at eight hours. In a separate well-controlled laboratory study, NexGard demonstrated 100% effectiveness against adult fleas 24 hours post-infestation for 35 days, and was >99% effective at 12 hours post-infestation through Day 21, and on Day 35. On Day 28, NexGard was 81.1% effective 12 hours post-infestation. Dogs in both the treated and control groups that were infested with fleas on Day -1 generated eggs at 12- and 24-hours post-treatment (0-11 eggs and 1-7 eggs, respectively). At subsequent evaluations post-infestation, fleas from the treated group continued to be essentially unable to produce any eggs (0-1 eggs) while fleas from the control group continued to produce eggs (1-141 eggs).

In a 90-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of NexGard against fleas on the Day 30, 60 and 90 visits compared with baseline was 88.0%, 89.7%, and 99.9%, respectively. Collectively, the data from the three studies (two laboratory and one field) demonstrate that NexGard kills fleas six times before they can lay eggs, thus preventing subsequent flea infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >97% effectiveness against *Dermacentor variabilis*, >95% effectiveness against *I. scapularis*, and >95% effectiveness against *Rhipicephalus sanguineus*, 48 hours post-infestation for 30 days. At 72 hours post-infestation, NexGard demonstrated >97% effectiveness against *Amblyomma americanum* for 30 days. In two separate, well-controlled laboratory studies, NexGard was effective at preventing *Borrelia burgdorferi* infections after dogs were infested with *loxosceles* vector ticks 28 days post-treatment.

**Animal Safety:**
In a margin of safety study, NexGard was administered orally to 8 to 9-week-old Beagle puppies at 1, 3, and 5 times the maximum exposure dose (6.3 mg/kg) for three treatments every 28 days, followed by three treatments every 14 days, for a total of six treatments. Dogs in the control group were sham-dosed. There were no clinically-relevant effects related to treatment on physical examination, body weight, food consumption, clinical pathology (hematology, clinical chemistry, or coagulation tests), gross pathology, histopathology or organ weights. Vomiting occurred throughout the study, with a similar incidence in the treated and control groups, including one dog in the fiv group that vomited four hours after treatment.

In a well-controlled field study, NexGard was used concomitantly with other medications, such as vaccines, anthelmintics, antibiotics (including topical), steroids, NSAIDS, anesthetics, and antihistamines. No adverse reactions were observed from the concomitant use of NexGard with other medications.

**Storage Information:**
Store at or below 30°C (86°F) with excursions permitted up to 40°C (104°F).

**How Supplied:**
NexGard is available in four sizes of beef-flavored soft chewables: 11.3, 20.3, 38.8, or 130 mg afoxolaner. Each chewable size is available in color-coded packages of 1, 3, or 6 beef-flavored chewables.

NDA 141-400, Approved by FDA
Marketed by: Frontline Vet Labs™, a Division of Merial, Inc.
Duluth, GA 30096-4640 USA
Made in Brazil.
©2018 Merial. All rights reserved.

1050-4493-07 Rev. 05/2018

---

Table 1: Dogs With Adverse Reactions.

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Afoxolaner</th>
<th>Oral active control</th>
</tr>
</thead>
<tbody>
<tr>
<td>N (%) (n=1015)</td>
<td>N (%) (n=200)</td>
<td></td>
</tr>
<tr>
<td><strong>Vomiting</strong> (with and without blood)</td>
<td>37</td>
<td>17</td>
</tr>
<tr>
<td><strong>Diarrhea</strong></td>
<td>33</td>
<td>1</td>
</tr>
<tr>
<td><strong>Lethargy</strong> (with and without blood)</td>
<td>13</td>
<td>3</td>
</tr>
<tr>
<td><strong>Anorexia</strong></td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>

---

1 Number of dogs in the afoxolaner treatment group with the identified abnormality.

2 Number of dogs in the control group with the identified abnormality.

---

In the US field study, one dog with a history of seizures experienced a seizure on the same day after receiving the first dose and on the same day after receiving the second dose of NexGard. This dog experienced a third seizure one week after receiving the third dose. The dog remained enrolled and completed the study. Another dog with a history of seizures had a seizure 19 days after the third dose of NexGard. The dog remained enrolled and completed the study. A third dog with a history of seizures received NexGard and experienced no seizures throughout the study.

**Post-Approval Experience (July 2018):**
There were no adverse events reported on post-approval adverse drug experience reporting. Not all adverse events are reported to FDA/CVM. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data.

The following adverse events reported for dogs are listed in decreasing order of reporting frequency for NexGard:

- Vomiting, pruritus, lethargy, diarrhea (with and without blood), anorexia, seizures, hyperactivity/restlessness, panting, erythema, ataxia, dermatitis (including rash, papules), allergic reactions (including hives, swelling), and tremors.

Contact Information:
For a copy of the Safety Data Sheet (SDS) or to report suspected adverse drug events, contact Merial at 1-888-637-4251 or www.merial.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/AnimalVeterinary/SafetyHealth.
As always, the facilities that earned high honors in this year’s dvm360 Hospital Design Competition boast features that improve hospital efficiency, offer an excellent patient and client experience, and are just plain gorgeous. But building or remodeling a veterinary hospital is no easy task, as these practice owners have learned. We asked the owners of some of these award-winning hospitals what advice they would offer other veterinarians who are considering building or remodeling. Here’s what they had to say.

**Do your research**

“The best piece of advice we can give is to conduct a thorough research process,” says Michael Foster, DVM, owner of merit award winner Southview Animal Hospital, P.A., in West Saint Paul, Minnesota. His team also found feedback from peers and the community during the design and construction process to be especially helpful and encourages other clinics to seek as much advice as possible.

“An effective hospital design comes from the heart, and the ability to engage with other professionals, including at the Hospital Design 360 conference, gave us a chance to express our story through the design of our hospital,” he says.

“Be sure you have a robust and realistic budget that considers all categories of the project,” adds Jonathan Kaufman, DVM, owner of Eastern Animal Hospital in Baltimore, Maryland, one of two runners-up in the over-8,000-square-feet category. “Rather than relying solely on the architect or bank for complete cost estimates, do your own research on potential expenses from start to finish so you’re thoroughly prepared before you present a budget to the bank.”

**Be organized**

Determine specifically what products and equipment you want to incorporate, says Samuel J. Kopman, DVM, owner of merit award winner Hearthwood Veterinary Hospital in Vancouver, Washington. “There are a lot of winning advice for hospital design

Words of wisdom about building or remodeling a veterinary hospital from some of the 2020 dvm360 Hospital Design Competition winners.
decisions to make and having a good idea of what you want will make it go easier," Dr. Kopman says. Another piece of advice: Have a good working relationship with your architect and contractor. “We had weekly meetings with our contractor during the building process,” he says.

**Employ veterinary-specific experts**
Many of this year’s Hospital Design Competition winners echo the advice of Dale S. Lonsford, DVM, and Charmel Rodick, DVM, co-owners of merit-award winning Deer Park Animal Hospital in Deer Park, Texas. “We strongly advise using an architect and builder who have experience and expertise in designing and building animal housing facilities,” Dr. Lonsford says. They also recommend having a solid grasp of your budget and letting the architect and the builder know you are serious about staying within it.

Keneth Skinner, DVM, co-owner of the over-8,000-square-feet award-winning Prescott Animal Hospital in Prescott, Arizona, agrees. “A professional veterinary hospital architect will guide you and keep your project going in the right direction. They know what you need, and they know about the things you did not know you needed,” he says. “They help all of your ideas make it to the blueprints and they make every step of the way a little easier. To have a project partner who understands your vision from the beginning is the only way to build.”

A veterinary-specific architect will know the most about animal-specific facilities and materials, says Steve Hotchkiss, DVM, who owns The PARC in Fort Worth, Texas, the second runner-up in the over-8,000-square-feet category. “Believe [your architect’s] estimates for pricing,” he advises. “I was sad that they were right on target. I thought I could build it for less.”

**Communicate well**
Robert Mankowski, DVM, co-owner of merit award winner Mount Laurel Animal Hospital in Mount Laurel, New Jersey, offers this excellent advice. “Communicate well with your staff regarding updates and progress, and thank them for their patience while building excitement for the new facility,” he says. “Expanding and renovating your practice is a huge adjustment,” he adds, “so expect at least a year to settle in and build protocols.”

**Have fun**
When asked what advice she would offer to other hospitals embarking on a new build or remodel/expansion, Marion Sewell, DVM, owner of merit award winner Ruston Animal Clinic in Ruston, Louisiana, suggests looking at and visiting as many veterinary hospitals as possible, and paying close attention to materials and floorplans. But above all, she says, “Have fun!”
MRI patterns help identify Chiari-like malformation in dogs

A recent study shows that analyzing the whole skull versus just the hindbrain in brachycephalic breeds would allow earlier diagnosis of Chiari-like malformation and syringomyelia—key to reducing the amount of pain a dog is in.

By Miranda Spindel, DVM, MS

Why they did it
Chiari-like malformation (CM) is a common developmental malformation of the skull and craniocervical vertebrae in several breeds of dogs, especially the Cavalier King Charles spaniel. Dogs with CM have a mismatch between the size of the brain and the skull, particularly at the craniospinal junction. CM is the most common cause of canine syringomyelia, which is characterized by fluid-filled cavities within the central spinal cord. These “syrinx” or “syringes” can cause neurologic damage that results in pain and clinical signs.

Diagnosis of CM/syringomyelia in dogs is not always straightforward. Cavalier King Charles spaniels with syringomyelia secondary to CM can have a range of conformation anomalies. Additionally, syringomyelia is not always associated with clinical signs and dogs with CM alone can exhibit signs of pain. Unrelated conditions are also common in breeds predisposed to CM/syringomyelia. Historically, diagnosing CM/syringomyelia early or accurately has been a challenge for veterinarians.

Studies aimed at facilitating diagnosis have examined the rostral cranial cavity and craniocervical junction. The current study aimed to investigate the orofacial region through use of a previously developed machine learning technique for diagnosis. Machine learning is an application of artificial intelligence in which the system automatically learns and improves from experience. Use of a data-driven technique like this eliminates the risk for observer bias. The study authors hypothesized that features of brachycephaly were associated with the same anatomic deviations leading to CM with pain and clinically relevant syringomyelia.

What they did
A retrospective review of 206 Cavalier King Charles spaniels that presented for neurologic pain or pre-breeding CM/syringomyelia screening between 2013 and 2017 was conducted. Inclusion required having been evaluated by weighted magnetic resonance imaging (MRI) of the cervical spinal cord and head, including the nasal cavity. Age at MRI, final diagnosis, clinical and behavioral signs of pain, and maximum transverse diameter of the central canal dilation or syrinx (if present) were evaluated. Dogs were excluded if images did not include the rostral head or if the diagnosis was equivocal (for example, if an alternative explanation of pain was identified or if the patient was younger than 4 years of age, as syringomyelia is typically a late-onset disease). Dogs with a milder syringomyelia phenotype (transverse width of 2-3.99 mm) were also excluded, as a previous study has suggested that specific clinical signs associated with syringomyelia are seen in dogs with a syringomyelia transverse width of 4 mm or more. Sixty-six dogs (32 females, 34 males) were identified, of which 40 had syringomyelia and 26 did not; 140 dogs were excluded from the study.

After identification of the study cohort, all of the MRI images were anonymized and randomized. The study cohort was then divided into three clinical groups for statistical analysis:

- Group 1 (control group): dogs with CM that were otherwise clinically normal (n = 11)
- Group 2: dogs with CM and pain (n = 15)
- Group 3: dogs with CM with syringomyelia-specific clinical signs (n = 40)

Because the study aim was broad, morphometric mapping was divided into two separate studies, one focusing on anatomic features relating to the soft palate and the other on anatomic features relating to the hard palate. Using machine
learning and two imaging software packages, orofacial structures involving the hard and soft palates with respect to CM and syringomyelia were measured.

What they found
Machine learning identified the floor of the third ventricle, nearby neural tissue and a region in the sphenoid bone as biomarkers for CM pain. It found that the presphenoid bone and the region between the tongue and soft palate are biomarkers for syringomyelia.

Dogs with clinically relevant CM/syringomyelia were more likely to have brachycephalic features of rostral skull flattening with reduction of nasal tissue and a well-defined stop. In dogs, the stop is the degree of angle change between an animal’s skull and the nasal bone near the eyes.

Take-home message
This research characterized differences in MRI images of healthy dogs from those with clinical signs of pain associated with CM and syringomyelia. This study suggests that the whole skull should be analyzed when diagnostic testing or pre-breeding screening is performed. Doing so has implications for breeders and would allow for earlier diagnosis and implementation of pain management strategies. This research also demonstrates the exciting potential of machine learning techniques to be applied to a variety of breeds and diseases.

Dr. Spindel serves as the shelter medicine consultant and student advocate for VIN. She completed the first residency in shelter medicine with a master’s of clinical sciences through Colorado State University in 2007, and then worked as the senior director of shelter medicine at the ASPCA for 10 years. She is a member of the Shelter Medicine Organizing Committee and Residency Committee for Shelter Medicine for ABVP.

REFERENCES
Orthopedic outcomes improve when surgeons and rehab teams work together

Solid communication between surgeons and rehabilitation specialists is the key to successful outcomes for orthopedic surgery patients.

Orthopedic surgery and rehabilitation go hand in hand, say surgeon David Dycus, DVM, MS, CCRP, DACVS-SA, from Veterinary Orthopedic & Sports Medicine Group in Annapolis Junction, Maryland, and rehabilitation specialist Matthew Brunke, DVM, DACVSMR, CCRP, CVPP, CVA, from Veterinary Surgical Centers Rehabilitation in Vienna, Virginia. These former coworkers explain why it’s important for surgeons and rehab specialists to work together for optimal patient outcomes.

The surgeon says...
For people who undergo orthopedic surgery, the process typically follows the same course—surgery, home to rest, then physical therapy, Dr. Dycus says, noting that the animal surgical experience has begun to mirror that in humans.

“Over the past 10 or 15 years, the field of veterinary rehabilitation has really started to boom and come into play as being something that’s recommended on a routine basis,” he says.

This is where communication between the two specialties comes in: The doctors must be coordinated for future treatment. “If I do a TPLO versus a lateral suture, for example, we really want to create a patient-centered, specific response as to how we manipulate those tissues,” Dr. Dycus says. Sharing this information is essential so the next specialist can take the right approach to the patient.

The rehab specialist says...
Dr. Brunke agrees. “You guys can do wonderful work in the operating room [that] an owner can undo by not taking care of the dog going forward, or the cat going forward,” he says. “Pass that baton of case management [to the] rehab doctors.”

He notes out that this team approach can then point back to the surgeon if something goes awry with the patient’s recovery. "It’s all about the communication. We want to make sure these guys are comfortable, they’re going to have achievable goals, and then we set them up for success as we go through each step," Dr. Brunke says. "But it has to be good communication because when something’s not right that we may notice, then it’s that team approach to get them back to you guys in the operating room if needed."

In fact, he argues, “we’re probably actually going to have less of a complication rate because they’re going to be well managed. Think about all those owners that are out there that have four or five kids, working two jobs, and are maybe not trained on how to properly care for their pet … after surgery. The guidance and oversight from the rehab team—including technicians, physical therapists, and doctors—makes for a better outcome across the board.”

Drs. Dycus and Brunke are both Fetchdvm360 conference speakers and dvm360.com contributors. For more insight from them about veterinary orthopedic surgery and rehabilitation, visit dvm360.com
RECOMBITEK Lyme has all the protection dogs need, and none of the antigens they don’t.

✓ THE ONLY canine Lyme vaccine that is nonadjuvanted and contains a single protein, lipidated OspA

✓ A lipidated form of OspA has been shown to be more immunogenic than a nonlipidated form of OspA¹

✓ Effective protection that blocks *Borrelia burgdorferi* while it’s still in the tick²


Tickborne disease surveillance: An adaptive approach

In light of global ecologic changes altering emergence patterns of tickborne zoonoses, investigators mapped out a novel framework for scoping out the influx of ticks—and the diseases they bring—into new geographic areas.

By Joan Capuzzi, VMD

Zoonotic pathogens are moving targets. Most originate in wildlife as likely evidenced by the latest global threat, COVID-19. Shifts in associated disease patterns result from increased human contact with wildlife, globalization of human travel and trade, broad ecologic changes and vector/pathogen evolution.

Lyme disease, or borreliosis, is the most common vector-borne illness in temperate areas of the northern hemisphere. Long established in southern and central Europe, northern Asia and the northeastern United States, it likely penetrated Canada over the past two decades in concert with the northward spread of its tick vector, *Ixodes scapularis*, and its causative agent, the bacterium *Borrelia burgdorferi*.

To better understand the current approaches and major challenges associated with surveillance of emerging tickborne zoonoses, investigators from the University of Guelph’s Ontario Veterinary College used the incursion of Lyme disease into Canada as an archetype for study.

**Study design**

A review of the available literature describing different disease surveillance programs honed in on the emergence of Lyme disease in Canada. Using two databases, PubMed and Web of Science, the investigators searched publications dating from 1990 through 2016. A total of 339 titles and abstracts were reviewed, of which 107 were determined to be relevant.

**Survey results**

Public health surveillance—the continuous collection and analysis of health data for evaluating and planning public health programs—can flag emerging epidemics and assess interventions.

Two surveillance styles exist: passive and active. Through passive surveillance, health data are submitted voluntarily by the public and the medical community, among others. For Lyme and other tickborne zoonoses, passive surveillance might involve collection of ticks from people or pets, or human disease reporting. This type of disease oversight is generally inexpensive and lean on time and labor investment.

Active surveillance, on the other hand, is more costly and labor intensive because it involves coordinated efforts by public health officials to gather medical data. For tickborne diseases, this might mean collecting both free-living ticks from the environment and ticks from small hosts, and testing them for pathogens in the laboratory.

Passive and active tickborne disease surveillance programs can be coupled as follows: Passive tick surveillance might be employed broadly, for collection of ecologic data, for instance, and then active surveillance can be applied in areas where elevated risk was identified through passive study.
Table 1 outlines the variety of specific approaches for surveillance of I. scapularis, B. burgdorferi and Lyme disease that were tagged and analyzed.

Tickborne zoonoses surveillance programs have many challenges. During the early stages of emergence, low awareness can hinder reporting efforts by the public and the medical community. Furthermore, as growing awareness boosts reporting, the true incidence can falsely appear to be surging. Surveillance programs are further hampered by arbitrary geographical borders, nonstandardized data, communication issues impacting data collection and analysis, and insufficient resources for extending studies longitudinally.

Finally, ticks themselves are tough to track. Their questing behavior and spot densities are variable and inconsistent. Plus, their bites can go undetected, and a delay exists between bite and symptom onset.

Shortly after I. scapularis reared its ugly head and announced its spread through Canada in the early 1990s, public health officials and researchers met to address risks. Multi-province active and passive tick surveillance programs mapped tick densities, and public education programs were initiated. In some regions, passive tick surveillance programs gave way to targeted active surveillance aimed at detecting changes in ticks’ ranges.

In 2009, Lyme disease was declared a reportable disease in Canada, and in 2014 the Canadian Parliament passed legislation mandating a national framework for Lyme disease surveillance. A comprehensive review of surveillance systems for emerging tickborne diseases highlights the need to make them adaptive as vectors, hosts, pathogens and ecologic factors evolve. An adaptive approach that incorporates necessary experts, comprehensive data points and resources sufficient for maintaining long-term research protocols can enhance surveillance data across all phases of disease emergence, from pre-emergence to endemicity.

Table 1 outlines the variety of specific approaches for surveillance of I. scapularis, B. burgdorferi and Lyme disease that were tagged and analyzed.

Table 1. Surveillance approaches for I. scapularis, B. burgdorferi and Lyme disease

<table>
<thead>
<tr>
<th>Surveillance approach</th>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collect canine serum samples from veterinary clinics and laboratories and test for exposure to B. burgdorferi</td>
<td>• Simple and very sensitive&lt;br&gt;&lt;br&gt;• Dogs have a high likelihood of tick exposure and are a sentinel for human disease risk</td>
<td>• May have false-positive results in low prevalence areas&lt;br&gt;&lt;br&gt;• Selection bias&lt;br&gt;&lt;br&gt;• Clinic location not always the location of tick exposure&lt;br&gt;&lt;br&gt;• Tick prophylaxis influences tick/pathogen exposure</td>
</tr>
<tr>
<td>Collect and identify (+/- pathogen testing) ticks from hunter-harvested deer at hunter check-in stations</td>
<td>• Gauges tick presence in an area&lt;br&gt;&lt;br&gt;• Tick abundance on deer positively correlates with local human incidence of Lyme disease</td>
<td>• Low spatial specificity&lt;br&gt;&lt;br&gt;• Results influenced by deer density and presence of check-in stations&lt;br&gt;&lt;br&gt;• Deer can clear B. burgdorferi from feeding ticks, rendering testing these ticks for this pathogen less reliable</td>
</tr>
<tr>
<td>Mine medical insurance claims data for Lyme disease testing and/or treatment</td>
<td>High sensitivity</td>
<td>High rates of false positives</td>
</tr>
<tr>
<td>Mine private laboratory testing data for positive diagnoses</td>
<td>High sensitivity</td>
<td>Clinical histories unavailable</td>
</tr>
</tbody>
</table>

Novel surveillance approach

This comprehensive review of surveillance systems for emerging tickborne diseases highlights the need to make them adaptive as vectors, hosts, pathogens and ecologic factors evolve. An adaptive approach that incorporates necessary experts, comprehensive data points and resources sufficient for maintaining long-term research protocols can enhance surveillance data across all phases of disease emergence, from pre-emergence to endemicity.

Though this framework was created for tickborne zoonoses, it can be applied to a variety of other vector-borne and zoonotic diseases.

References available at dvm360.com

Dr. Capuzzi is a small animal veterinarian and journalist based in the Philadelphia area.
Nutritional management of chronic kidney disease

Therapeutic diets are the gold standard in managing veterinary patients with CKD. Here’s why, and how to coax these pets to eat.

By Ed Carlson, CVT, VTS (Nutrition)
Compared with maintenance diets, therapeutic renal diets generally have restricted protein, phosphorus and sodium levels. The quality of the protein in these diets is extremely important. Diets containing highly digestible protein with the correct balance of amino acids minimize nitrogenous waste. These calorically dense diets contain reduced amounts of dietary phosphorus, increased omega-3 fatty acids, antioxidants, B vitamins and potassium to help prevent hypokalemia, which has been shown to contribute to renal dysfunction. They also contain buffers to help control acidemia, which may contribute to muscle wasting. Protein sources of lesser quality generally contain nonessential amino acids that may be catabolized to urea and may contribute to increased clinical signs in patients with advanced stages of chronic kidney disease (CKD).

**Therapeutic diets: the gold standard in CKD**

Two decades ago, results of a study by Elliott et al. showed that dogs with CKD fed a therapeutic renal diet lived significantly longer than dogs fed a maintenance diet (median survival time, 633 vs. 264 days). In another randomized double-blind study, cats fed a therapeutic renal diet experienced 26% fewer uremic episodes compared with those fed a maintenance diet. None of the cats fed the renal diet died during the study, but 22% of those in the control group died.

In a presentation at the 2017 Hill’s Global Symposium, Jessica Quinby, DVM, PhD, DACVIM, noted that “…based on published evidence, feeding a dietetic renal food is the single most effective management option for improving survival and quality of life in dogs and cats with CKD. While emerging evidence highlights the benefits of dietetic renal food in dogs with IRIS [International Renal Interest Society] Stage 1 CKD, more research is needed to confirm the most optimal nutritional management in early stages of the disease.”

Most renal diets fall within the Association of American Feed Control Officials’ minimum requirements for adult maintenance diets for healthy dogs and cats. There is no evidence to support the premise that dogs and cats eating therapeutic renal diets will lose muscle weight or body weight if the patient is eating its daily caloric requirements of the diet. Results from a 2-year randomized controlled trial showed no difference in body condition score or body weight in cats with CKD eating a renal diet versus a maintenance diet.

Restricting dietary phosphorus has been shown to help slow the progression of renal disease. Several studies have shown that feeding therapeutic diets increases survival rates and significantly reduces plasma phosphorus and parathyroid hormone levels compared with feeding diets higher in phosphorus. As renal disease progresses, however, it may become impossible to keep phosphorus concentrations within the IRIS guidelines using diet alone. If serum phosphorus remains high 4 weeks after transitioning to a therapeutic renal diet, a phosphate binder should be considered.

High sodium levels in diets fed to patients with CKD may cause sodium retention due to the expansion of extracellular fluid volume, hypertension, fluid overload and edema. However, excessively limiting dietary sodium may cause a negative sodium balance resulting in reduced extracellular fluid volume, plasma volume and glomerular filtration rate (GFR). Dietary sodium has been shown to have no impact on blood pressure in dogs and cats. Restricting sodium may contribute to muscle wasting in cats.

Cats with CKD are prone to potassium deficiency; however, this is not common in dogs. Decreased potassium levels may be caused by anoxia, vomiting and increased urinary losses due to polyuria. Serum potassium should be monitored and supplemented when necessary. For cats with hypokalemia, oral supplementation with potassium gluconate should be considered if diet alone does not maintain serum potassium concentration above 4.0 mEq/L. Oral administration is the safest and preferred method unless a critical emergency exists or oral administration is impossible or contraindicated. Oral potassium gluconate appears to be tolerated well by most patients. The dose is adjusted based on the patient’s clinical signs and serum potassium levels, which initially should be checked every 2 to 4 days until stable and then every 2 to 4 weeks thereafter.

**Getting the CKD patient to eat**

The daily energy requirement (DER) for dogs with CKD is 1.1 to 1.6 times the patient’s resting energy requirement (RER); for cats the DER is 1.1 to 1.4 times RER. A slow transition (dogs over 1-2 weeks or longer, cats over 3-4 weeks or longer) is recommended to increase the likelihood that the patient will accept the new diet and to enable a gradual change in urinary sodium levels.

**Make the food enticing**

Educating owners about the importance of feeding appropriate diets to these patients and the need to transition gradually is vital. Cats, in particular, can be resistant to diet changes. A number of tactics can be used to help the pet become accustomed to the new food:
• Transition to the new diet slowly.
• Offer the old and new diets in separate side-by-side dishes rather than combining them in a single dish.
• Offer the new diet in a flat dish rather than a bowl, even if the pet normally eats from a bowl.
• Add low-sodium tuna juice, chicken broth or even water to the food.
• Warm the food.
• Provide antiemetics for nauseated (or suspected nauseated) patients.
• Offer appetite stimulants, which may be especially effective when started at the hyporexia or dysrexia stage.

It is not unusual for the CKD patient to eat only a small amount of food or to stop eating altogether. In a 2015 survey of owners of cats with CKD, reduced appetite was reported by 43% of owners; 77% of those owners coaxed their cat to eat 50% of the time.6

Patients with CKD that do not consume their daily caloric requirement will suffer muscle loss as it is catabolized to provide energy to the body. Reduced food intake also means the patient is not consuming adequate protein, which will also lead to muscle loss.

Suggest an E-tube
An often underutilized option is the use of an esophageal feeding tube. Not only can E-tube feeding extend a patient's life, it can help improve quality of life for both the patient and the owner. Veterinary therapeutic diets may be made into a slurry, and most clients can manage assisted feeding easily at home. Clients can also use the feeding tube to administer the multiple medications that many CKD patients have been prescribed, often more easily than by mouth. Additional water administered via the feeding tube can eliminate the need for subcutaneous fluids; not only is this easier for most clients but the water is used more easily by the body. ●

Ed Carlson, CVT, VTS (nutrition), is the technician learning and development manager at InTown Veterinary Group.

REFERENCES

Idexx reports negative COVID-19 results for thousands of canine and feline samples

Idexx has tested thousands of dogs and cats, and all came up negative for the coronavirus strain that causes COVID-19.

DESPITE TWO REPORTS OF DOGS in Hong Kong testing positive for COVID-19, national and international health organizations continue to assure pet owners that dogs and cats cannot contract or transmit the disease. Now, global veterinary diagnostics firm Idexx Laboratories offers further proof that statement is true.

Idexx announced in mid-March that the company has evaluated “thousands of canine and feline specimens during validation of a new veterinary test system for the COVID-19 virus” and has seen “no positive results in pets to date of SARS-CoV-2, the coronavirus strain responsible for the coronavirus disease 2019 (COVID-19) respiratory outbreak in humans,” according to a company press release.

The specimens used to develop the test were obtained from specimens submitted to Idexx Reference Laboratories for polymerase chain reaction testing. Details about the Idexx SARS-CoV-2 (COVID-19) RealPCR Test can be found on the Idexx website.

These new test results support expert recommendations against testing pets for the COVID-19 virus. Pet owners whose dog or cat is demonstrating respiratory clinical signs are advised to contact their veterinarian to test for more common respiratory pathogens.

“Should leading health authorities determine it is clinically relevant to test pets for the COVID-19 virus, Idexx will be ready to make the Idexx SARS-CoV-2 (COVID-19) RealPCR Test available,” says Jay Mazelsky, president and CEO of Idexx Laboratories, in the release. “Pets are important members of our family, and we want to keep them healthy and safe. We will continue to monitor COVID-19 and pet health across our global Idexx Reference Laboratories network as this situation evolves.”●
Given the choice, what diet would a pet choose?

The dogs and cats in this study were free to eat from four different diets with varying macronutrients. So, when given their druthers, let’s see what they devoured, as assessed by their circulating metabolites.

By Michael Nappier, DVM, DABVP

A plethora of dietary options exist for dogs and cats today. This allows owners to make nutritional decisions previously not available. These decisions may be made for many reasons, some of which are not related to the health or wellbeing of the pet. As a result, these diet decisions affect the available circulating metabolites in the pet. The authors of this study1 wanted to find out what the circulating metabolites in a dog or cat would be if they were allowed to self-regulate their nutrition.

What they did
Seventeen dogs and 27 cats were used from a study colony. Each was allowed to free feed from a choice of four diets—one high in protein, one high in fat, one high in carbohydrates and one with balanced macronutrients. Cats were fed freely throughout the day but food was removed when a predetermined maintenance caloric intake was reached. Dogs were separated and fed once daily for a one-hour feeding period and were limited to a predetermined maintenance caloric intake. This was continued for 28 days for both cats and dogs. Plasma concentrations of multiple different metabolites were measured at the beginning and end of the trial.

What they found
Dog saw relatively few metabolite changes when allowed to self-regulate, with the only significant difference being higher concentrations of arachidonic acid. Cats saw significant increases and decreases in various amino acids as well as higher concentrations of highly polyunsaturated fatty acids.

Take-home points
This study confirms that different food choices affect dogs and cats on a much greater metabolic level than was previously known. By allowing the animals to self-select, the authors attempted to establish what may be a normal baseline for these animals. This may provide the basis for future study into differences in specific diets.

REFERENCE

Dr. Nappier is assistant professor of community practice in the Department of Small Animal Clinical Sciences at the Virginia-Maryland College of Veterinary Medicine in Blacksburg, Virginia.
What to know before you buy a veterinary clinic

Before you buy a veterinary hospital, make sure you understand the basic financials of the practice and get some expert advice on the details to make sure you know what you’re paying for.

By Stith Keiser
Many years ago, I wanted to buy a horse, so I made the long drive from Kentucky to Wyoming to spend several days riding and roping a wide assortment. A Roan Quarter Horse named Remington eventually worked himself to the top of the list. As “right” as he felt, though, I remember my mentor at the time stressing the importance of having the local veterinarian do a prepurchase exam. He emphasized that I was looking not just for a horse, but for the horse I’d be investing my time, money and energy into for the next 20 years. I owed it to myself and Remington to know exactly what I was getting.

My mentor’s advice has stuck with me through the years, especially in my career. As a multihospital practice owner, I’ve explored many potential practice purchases and, just as I did with Remington, I am always looking for just the right one to add. Most other private practice owners I know are in similar shoes. So, if you’ve decided that an existing practice is right for you—regardless of whether it’s your first, your 10th or the last hospital you’ll own—you need the business version of a prepurchase exam.

Don’t do it alone
When it comes to a prepurchase exam for a veterinary-clinic-sized investment, don’t use your general accountant or that brother-in-law who dabbles in valuations. Find a veterinary valuation analyst. If you’re not sure how, check out vetpartners.org for a directory of experts.

Your starting point is ensuring you have a basic understanding of several key financial documents and how to use them in the prepurchase exam.

What’s on the balance sheet (and why you should care)
We hear a lot about profit-and-loss statements (P&Ls) in veterinary medicine, but balance sheets don’t get enough attention. Here’s the CliffsNotes version of what shows up on this:

- **Assets**, the things a veterinary hospital owns with monetary value, are listed in categories based on how quickly they can be turned into cash, sold or consumed. Current assets include cash, accounts receivable and short-term investments. Fixed assets include the building and equipment.
- **Accumulated depreciation** may be subtracted from assets to show the actual value of physical resources.
- **Liabilities** reflect all the money a practice owes to others: loans, accounts payable, wages, taxes and other debts. Current liabilities are typically due within one year, while long-term liabilities are usually due over a longer period of time.
- **Owner’s equity** (net assets or net worth) represents the assets that remain after deducting what a practice owes. This is not the same thing as practice value.

Balance sheets are used to calculate basic ratios, including the hospital’s ability to meet financial obligations and to make payments when they’re due (“days’ cash on hand”). As a potential buyer, you’re looking for a clinic that has struck a balance between having enough cash to pay bills each month and meet any unexpected expenses, but not so much cash that assets are being used inefficiently. Rather than just letting the cash sit in your checking account, you may want to invest in, for example, hiring a new veterinary technician who can generate additional income.

Other ratios include debt ratio and debt-to-equity ratio to evaluate how effectively a practice uses credit to finance operations. You want to compare the current reporting period with previous periods using a percentage-change analysis to answer important questions:

- Has the practice added assets?
- Has it accrued more debt?
- Are liabilities under control?
- Are accounts receivable growing or shrinking?

If there are inconsistencies in these trends, you need to further clarify with the seller or broker.

Until recently, we didn’t hear much about the value of balance sheets in our profession, which means key performance indicators...
are difficult to find. As an aspiring practice owner, even understanding their value gives you a great place to start.

P&Ls: The other half of the financial picture
A P&L complements the balance sheet. Looking at one without the other is like running bloodwork without also doing a urinalysis. For those unfamiliar with P&Ls—that was me early in my career—they’re income statements categorizing a veterinary hospital’s revenue and expenses for a given time period. Practice owners must be able to use P&Ls to (1) identify opportunities to generate profit by ethically increasing revenue and decreasing costs, (2) highlight areas where expenses need to be tightened or where additional spending might benefit the hospital and (3) plan for profits, including managing supplies, capital investments and the practice owner’s return on investment.

I tend to focus on five primary P&L numbers when I’m considering a hospital purchase. They offer insight into the current level of management, and they represent an opportunity post acquisition:

- **Gross revenue**: the money brought in by the practice during a given time period before expenses are subtracted
- **Net income**: the hospital’s revenue minus all “ordinary” expenses
- **Payroll**: includes wages, taxes, worker’s compensation, benefits, uniforms, CE and contracted veterinary specialists
- **Cost of professional services** (also referred to as cost of goods sold): combines expenses associated with providing the services the practice offers—cost of professional services, pharmacy, laboratory, imaging and radiology, dentistry, and grooming and boarding

- **Rent or real estate mortgage**: the cost to lease the facility or pay the mortgage or rent to the seller if the building is owned outright (does not include facility costs, utilities or repair)

Pulling reports from your practice software
There are a wide variety of reports you can pull from your practice management software. When I’m analyzing a practice, I tend to focus on period totals, production by provider and inventory.

Remember that business models and philosophies affect these. For example, a high-volume practice may have a much lower average daily transaction (ADT) than a low-volume, high-touch hospital but still have a similar profit margin as long as patient volume makes up for lower transactions. Similarly, even though one benchmark finds that the average practice nationwide brings in 24 new clients per month per full-time-equivalent veterinarian, a practice with high client turnover or a low client bonding rate might need many more than that. Someday a seller might tell you their ADT is low because of their clientele, compliance rate, etc., and while I recognize that a hospital in a ritzy part of Seattle better have a higher ADT than a hospital in Plainville, Kansas, that doesn’t mean the numbers don’t offer insight into how the practice is being run and opportunities that may exist for a buyer.

The first practice I owned was in a small town in rural Nebraska. When my partner and I purchased the clinic, the former veterinarian’s ADT was $93. The hospital was located in a county with one of the highest percentage of citizens on welfare in the entire state, and our staff was convinced that clients would never want, or be able to afford, better care. My partner and I didn’t walk into the hospital with the goal of raising the ADT to the national average or any other arbitrary number, but we did diagnose why our average was $93 and evaluate what that told us about the medicine and client compliance. Then we set forth to improve those two things. Five years later, my partner has elevated both quality of care and compliance, with an ADT running just over $200 in that small, one-doctor, mixed-animal rural practice.

Check the checklists for staff, equipment and inventory
A staff list—complete with tenure, position, wages and benefits—will help you plan how to leverage the team you may inherit as well as determine whether your staffing ratios are where you want them. Verified lists of equipment and inventory are two of the few tangible assets you’re buying in a hospital acquisition, and they’ll help you evaluate the level of in-house diagnostics your hospital can support as well as any capital purchases you may need to make.

A final word
We’ve just scratched the surface of important tools in your toolbox as an aspiring owner. Sure, every hospital will have strong months and weak months for revenue, but dishonest sellers can manipulate net income over a short period of time to inflate it. When conducting your pre-purchase exam, look for trends over time. Conducting a thorough exam isn’t necessarily quick and easy, but just as with that Quarter Horse I had my eye on, if you’re looking for a career-long investment, due diligence on the front end is well worth the effort.

Stith Keiser is CEO of veterinary consulting firm Blue Heron Consulting.
It's 2020, and despite the fact that we now live in a membership-driven society in which monthly payments for products and services are the norm, many veterinary practices remain uncertain about whether to offer wellness plans. You'd be hard-pressed to find someone today who doesn't have a car lease, a massage membership or a subscription to Amazon Prime, Disney+ or Netflix. These plans allow people to budget their discretionary income on a monthly basis in order to gain access to the things they want—sometimes getting unlimited access to certain services or discounts.

In light of this trend, veterinary practices may want to consider implementing wellness plans as a means to offer clients better access to your services and in turn allow you to care for more pets. Of course, there are two sides to every coin, so be sure to weigh the pros and cons before deciding what makes the most sense for your hospital, clients and patients.

**Pros**

**Client convenience**
Wellness plans offer clients the option to pay over time for a group of doctor-recommended preventive care services. This option can give some clients access to comprehensive pet wellness care that they otherwise may not be able to afford or may not want to pay for in a lump sum. The ability to budget is something that more and more clients need in order to provide the best care for their pets.

**Loyalty**
Offering a membership at your hospital can foster client loyalty. Practices can make their "members" feel like part of the "club" by offering them something special when they sign up and congratulating them on social media for choosing the best care available for their pet ("...and with our UNLIMITED exams, Smokey will never have to ‘wait and see’ before coming in to see Dr. Parker...").

**Proactive care**
Wellness plans allow veterinary team members to be proactive in caring for pets rather than reactive when a pet becomes sick. Often, these plans incorporate annual early detection screening such as lab work or radiographs that can identify health problems early and allow you to address potentially serious issues before they become life threatening.

**Better cash flow**
Wellness plans can improve your hospital’s cash flow by generating steadier revenue over time, which may help alleviate any seasonal ups and downs. By offering monthly payment options for annual wellness services, you can expect the same payments month to month throughout the course of the year instead of the typical revenue surge during the warmer months.

**Cons**

**Limited use**
Wellness plan are hospital specific. If a pet needs emergency or specialist care, wellness plan coverage from your practice won’t apply. Additionally, clients who use multiple hospitals may decide wellness plans are not the best option for them. But don’t fall into the trap of making that decision for them; it’s much better to present clients with the option and let them decide.

**Confusion about coverage**
Clients can confuse wellness plans with pet insurance. Be sure to head this off at the pass by clearly explaining what your plan includes. This also presents a good opportunity to discuss how pet insurance can complement a wellness plan by allowing the client to budget additionally for accidents or illnesses their pet may experience.

**Coming off as "salesy"**
Offering a wellness plan to a client at the wrong time can be seen as putting a sale ahead of the care of the pet. Be careful you don’t come across as pushy by putting your wellness plan before the medicine. Make recommendations for the pet’s wellness care, and then explain how your plan includes these recommendations and will allow the client to pay over time.

**The bottom line**
Just as Baby Yoda has single-handedly driven Disney+ subscriptions through the roof, wellness plans can help your hospital remain successful into the next millennium. When it comes to implementing them into your hospital and culture, always remember: Do or do not ... there is no try.
Punitive training makes dogs pessimistic

A recent veterinary behavior study shows that aversive training methods can negatively impact the welfare of dogs.

By Joan Capuzzi, VMD

Aversive methods for training dogs have prompted much debate over whether they compromise animal welfare. While previous studies have corroborated the link, a recent review of the literature revealed study methodologies that were insufficient for drawing practical conclusions. Many relied solely on surveys, studied only subpopulations like police and laboratory dogs, zeroed in on shock-collar training to the exclusion of other training techniques, or examined short-term effects but failed to explore long-term welfare indicators as well.

A recent study, by contrast, evaluated both the short- and long-term effects of positive and negative reinforcement on companion dog welfare. Behavioral and physiologic data were collected to assess short-term effects, and decision-making tasks were employed to evaluate long-term consequences. An understanding of how different training methods impact canine welfare can lead to the establishment of training protocols that lessen dogs’ stress and safeguard their wellbeing.

What researchers did
Investigators at the Abel Salazar Biomedical Sciences Institute in Porto, Portugal recruited 92 dogs, all around 2 years old, from three punishment-based (“aversive group”) and four reward-based (“reward group”) dog training schools in the Porto metropolitan area.

A short-term welfare assessment incorporated video recordings of three training sessions and six saliva samples (three post training and three at-home baseline collections). The videos were analyzed for frequency of stress-related behaviors—such as crouching and yawning. In the saliva samples, cortisol concentrations were measured.

A long-term welfare assessment utilized a spatial cognitive bias task: The dogs were trained to associate one side of the room with a bowl containing a sausage treat (“positive”) and the other side of the room with an empty bowl (“negative”). Then the researchers conducted three trials placing an empty bowl at sequentially different locations—near the positive bowl, near the negative bowl and exactly between the two—and timed how quickly each dog reached the edge of the bowl in search of sausage. The scientists hypothesized that the speed at which each dog approached the bowls (approach time) would negatively correlate with the animal’s degree of pessimism.

What they found
Short-term welfare indicators (negative behavior and elevated cortisol levels) were more prevalent in the aversive group. Videos of training sessions showed a significantly higher frequency of stress-related behaviors—turning the body, moving away, crouching, yawning, salivating and lip-licking—in the aversive group than in the reward group. Investigators also found a strong positive relationship between the number of stress-related behaviors a particular dog exhibited and the number of aversive stimuli used in that dog’s training school.

Analysis of training-elicited changes in salivary cortisol concentration revealed a significant difference between groups: Dogs from the aversive group experienced an average rise in salivary cortisol concentration of 0.10 µg/dl after training, while dogs from the reward group had no significant changes in post-training cortisol. Furthermore, the average differences in cortisol concentrations positively
correlated with the number of aversive methods used in training.

In the long-term welfare (cognitive bias) testing, there were no statistically significant differences in approach time between groups for the near-negative and near-positive bowls, but there were significant differences for the centrally placed (most ambiguous) bowl, with dogs from the aversive group taking longer to approach the bowl than dogs from the reward group. The research team also found a positive correlation between the number of aversive stimuli used at a dog’s training school and the time that dog took to reach the central bowl.

**What it means**

This empirical study looking at both short- and long-term effects of aversive and reward-based training on overall welfare of companion dogs revealed that those trained using punishment-based methods manifested reduced welfare compared with their reward-based counterparts. They displayed more stress-related behavioral and postural stress responses during their training sessions and higher post-training cortisol levels.

In the cognitive bias tasks, thought to measure long-term consequences of aversive training, dogs from punishment-based programs exhibited decision-making that modeled a more pessimistic mindset. Investigators also found that the higher the frequency of punishments used in training, the greater the impact was on overall dog welfare. They concluded that, effectiveness aside, if reward-based training methods are better for canine welfare than aversive methods, dog owners and handlers should integrate more of this methodology into training.

Dr. Joan Capuzzi is a small animal veterinarian and journalist based in the Philadelphia area.

**REFERENCE**

MOBILE VETERINARY

La Boit Specialty Vehicles
Creating a new standard that cannot be duplicated.

www.laboit.com  800-776-9984

PRACTICES FOR SALE OR LEASE

Practice Sales, Valuations, Associate Buy-Ins, Corporate Sales, & Buyer Representation. FREE Practice Appraisal in just 2 weeks! Contact Rebecca Robinson Davis, CBI, at 912-268-2701 or Hello@practicesalesadvisors.com. See our national listings @ www.practicesalesadvisors.com.

AZ NEW! Central Arizona- Solo-Doctor Practice, Grossing Over $1M, Real Estate Also Offered.
GA NEW! PERRY Area- Grossing $800K+, Real Estate & Practice Sales Price Only $700K!
GA NEW! Castleberry Veterinary Hospital- Newly Remodeled, 4 Exam Rooms, Leased Facility.
GA East of Atlanta- Charming Facility, Knowledgeable Staff, Loyal Clientele.
GA UNDER CONTRACT! South of Atlanta- Grossing Approximately $1Million, Seeking Corporate Buyer.
SC NEW! GREENVILLE- Grossing Approximately $1Million, Prime Commercial Location.
SC COLUMBIA Area- Solo Doctor Practice, Charming Facility, 1.3 Acres of Property.
FL NEW! CENTRAL FLORIDA Area- Small Animal Exclusive, Grossing $700K and Growing!
NC SOLD! LUMBERTON Area- Grossing $1.5Million, Sold to Corporate.
NM PRICE REDUCED! SANTA FE Area- Small Animal Practice, Seller Motivated!
NY SOUTHERN NY- $115 ATC, Solo-Doctor Practice, Practice and Real Estate Offered.
TN KNOXVILLE Area- Owner Willing to Stay On, Spacious Facility, Real Estate Also Offered.
TN SOLD! EASTERN TN - Grossing $1.3Million, 4,000SF Facility, Corporate Sale.

ARCHITECTS/BUILDERS

ARCHITECTS/BUILDERS

Get your message to veterinarians TODAY!

PLACE YOUR AD HERE

Get your message to veterinarians TODAY!

WANT TO BE IN THE KNOW?

Check out the veterinary news highlights every week at dvm360.com.

ANIMAL ARTS

architecture animals people

800.332.4413 www.animalarts.com
**MARKETPLACE | dvm360.com/products**

**MEDICAL EQUIPMENT**

**6 YEAR WARRANTY**

Son-Mate II Scaler / Polisher
Sale Price $1,825

A.D.S. 2000 Anesthesia Machine / Ventilator
Sale Price $5,795

**ANESTHESIA EQUIPMENT**

**BLUEPRINT FOR BREATHING**

Anesthesia made simple... A.D.S. 2000
Proudly made in the U.S.A.

Revolutionary Veterinary Breakthrough
- Anesthesia Machine (Positive Pressure)
- Electronically microprocessor controlled
- Delivery & Ventilation for small animal use
- Automatically sets breathing parameters
- Very affordable and easy to use
- Just connect to vaporizer & Oxygen
- Two year parts & labor warranty
- Lifetime loaner service

**NEW $4275**

1099 East 47th Street - Hialeah, Florida 33013 USA
800-445-8581 / FAX 305-685-7671
www.englerusa.com / www.engler411.com

Contact Yousef Elhusseini at YElhusseini@mmhgroup.com for more info about the ad space.

**ARCHITECTS/BUILDERS**

**PET ID PRODUCTS**

**ARCHITECTS/BUILDERS**

**CMP Construction**

Quality Projects Affordably Built

www.cmp-inc.net

**MICROCHIPS**

FREE LIFETIME REGISTRATION

ISO Compliant 134.2 kHz freq.
Readable by ANY Universal Scanner

www.911PetChip.com
(818) 445-3022 / jon@911petchip.com

**Specializing in Veterinary Architecture**

tcarchitects.com
430 Grant Street
Akron, Ohio 44311
(330) 867-1093
N o two veterinary dental extractions are the same because the anatomy of every animal’s mouth is specific to that animal. “No animal is ‘normal,’” says Mary Volker, DVM, DAVDC, a partner at the Animal Dental Center in Maryland. “None actually have the normal dentition they should have with the normal amount of roots.”

Nevertheless, Dr. Volker says there are three key factors you can focus on with every patient to help ensure your procedure will be a success: having adequate exposure, obtaining an adequate surgical flap and obtaining adequate bone removal.

**Adequate exposure**

“Exposure is very important because there should be no reason you should put a high-speed hand-piece into an area you can’t see,” says Dr. Volker. This may seem like common sense, but she says doctors sometimes don’t give themselves enough room to work, and this increases the risk for patient trauma and makes for a more difficult extraction.

**Adequate bone removal**

When it comes to bone removal, “start with about half the amount of bone off the side of the root,” Dr. Volker says, “but keep in mind that you might run into issues like resorption or ankylosis that requires a little more bone removal.”

Dr. Volker offers this pearl: “Make sure you have an x-ray up of the tooth that you’re extracting. That way you can see the anatomy while you’re extracting the tooth.”

Dr. Volker also counsels veterinarians about the importance of monitoring for iatrogenic fractured roots, noting that they can be quite common during extractions. “The more dentistry you do, the more you’re going to break roots occasionally, and that’s perfectly fine,” she says, but make sure you have enough exposure so you are able to extract the root completely. A postoperative radiograph prior to closure of the surgical site confirms complete extraction.

“I’d rather that any of the doctors I’m teaching remove a little bit more bone and safely extract than trying to use a high-speed where they can’t see where they’re going or, worse, putting too much force on the tooth and then pushing a root into a place it shouldn’t go,” she says.

---

**DISCUSSING DENTAL PROCEDURES WITH CLIENTS**

Trying to convince an owner that their pet needs dental care? Here are a few tips from Dr. Volker—with help from Fetch dvm360 conference attendees—to convince clients to follow your recommendations.

**Ask**

Ask the client to think of how they would look if they only brushed their hair once a year. Then, have them apply that kind of thinking to their dog’s mouth. If they’re only brushing those teeth once a year, imagine what’s going on in there. Dr. Volker advises veterinary teams to recommend oral home care products that have been approved by the Veterinary Oral Health Council (vohc.org). “These products have been shown to be efficacious in the treatment of plaque and tartar,” she says.

**Show**

Point out for the owner the pathology in their pet’s mouth during the consultation examination. Never anesthetize an animal without first looking in its mouth, Dr. Volker advises, and describe the pathology using terms the client can relate to: pain, infection, gingivitis, periodontal disease (bone loss that can lead to tooth loss). “Discuss that periodontal disease, tooth resorption and other dental issues are sources of chronic pain and infection that can be treated and usually completely corrected,” she says.

**Connect**

Keep your clients happy by calling that evening and the next day to check on the pet. Be ready for questions so you can intervene early if complications arise.
Cytology—a Doberman with weight loss, lethargy and nasal lesions

Below is a skin cytology from a 3-year-old male neutered Doberman pinscher with cutaneous lesions. What’s going on?

By Kaitlyn Bello, DVM

This patient is an active, outdoor dog that has been historically healthy until the gradual onset of weight loss and lethargy over the past few weeks. This particular dog spends much of its time in the woods behind the owner’s house. The owners are extremely concerned about the recent development of ulcerative lesions and draining tracts on the nasal planum and paws.

Correct answer:
B. Blastomyces dermatitidis

This is a case of cutaneous and systemic blastomycosis caused by Blastomyces dermatitidis. This patient likely became infected via direct inoculation, inhalation of spores from its wooded backyard environment, or both. This dimorphic fungus lives in damp environments, especially those containing decaying organic matter.

Cytologic examination of B. dermatitidis reveals broad-based, budding yeast. You will also see a thick, refractile double cell wall. Direct smears or aspirates of affected tissue are appropriate samples to be viewed cytologically to obtain this diagnosis. Biopsies of affected tissue can also be submitted; these will likely reveal nodular to diffuse, suppurative to pyogranulomatous dermatitis with associated budding yeast or septal hyphae.

Blastomyces can cause cutaneous or systemic disease. Common clinical signs include lethargy, weight loss, dyspnea, uveitis and cutaneous ulcerations. Cytologic examination of affected tissue is usually required to make the diagnosis; cultures and scrapings are most often negative in the early stages of the disease.

If Blastomyces is suspected, obtain thoracic radiographs and direct smears or aspirates of lung lesions; cultures of lung lesions can include pulmonic nodules. Common clinical signs include lethargy, weight loss, dyspnea, and cutaneous ulcerations.

Fluconazole and terbinafine work well in combination; ketoconazole in combination with amphotericin B is also effective. Oral itraconazole is the current medication of choice, but treatment courses can be very long compared to fluconazole and terbinafine. Direct smears of aspirates of lung lesions can include pulmonic nodules. Common clinical signs include lethargy, weight loss, dyspnea, and cutaneous ulcerations.

To obtain this diagnosis, biopsies of affected tissue can also be submitted. Performing a thorough orthopedic examination is also essential.

Options:
A. Histoplasma capsulatum
B. Blastomyces dermatitidis
C. Cryptococcus neoformans
D. Pemphigus foliaceus

What’s your diagnosis?

Dr. Kaitlyn Bello practices at BluePearl Veterinary Partners in Franklin, Tennessee.

Correct answer:
B. Blastomyces dermatitidis

(Flip to see the answer)
Over 35 Years of Quality and Innovation, Now Available to Your Veterinary Practice

Havel’s Inc. has a variety of veterinary products for your practice. Our affordable echogenic needles, developed by Hakko Medical for use during Ultrasound Guided Procedures, use Corner Cube Reflectors (CCR) or Micro Laser Etching (MLE) to reflect sound waves back to the transducer to illuminate the needle and improve success rates. Havel’s also has a large selection of quality surgical blades and sutures at competitive prices. Please call today for your free samples.

Get a free sample today:
John Barrett
1-800-638-4770, ext. 13
jbarrett@havels.com

See the needle, see the target and improve your success rate.