ACVC

Hyperthyroidism in Cats: What You Need to Know

In a lecture at the Atlantic Coast Veterinary Conference, Diane Monsen Levitan, VMD, DACVIM, discussed feline hyperthyroidism.

The most common endocrine problem of cats worldwide is hyperthyroidism. In the United States, the condition affects 10% of cats over 10 years of age. Veterinarians are detecting the disease at an earlier stage due to routine geriatric blood screening.

The actual number of hypertensive cats may be higher because it is difficult to monitor blood pressure regularly in cats and methods are lacking when it comes to keeping the cats calm in order to get accurate readings. Because hypertension in a hyperthyroid cat is related to hypertrophic cardiomyopathy, veterinarians should do a cardiac workup. Incidentally, Dr. Levitan has personally found pericardial effusion during cardiac ultrasound in a large percentage of hyperthyroid cats with hypertension.

(continued on page 10)

ACVC

Poultry as Pets: A Fad with Legs?

Not very much is known about the actual number of chickens living as pets in urban and suburban neighborhoods in the United States, but a Google search on their popularity yields more than 10 pages on the pros and cons (mostly pros) of owning them. And if sales of chicks are any indication, owning backyard poultry is a trend that’s found its following.

(continued on page 12)

CARDIOLOGY

When Should Mitral Valve Disease in Dogs Be Treated?

Cardiac disease is not uncommon finding in older dogs, with endocardiosis being the most frequent cause.

How frequently heart disease and murmurs are diagnosed in dogs is uncertain. This is because much of the data collected come from specialty centers and universities—not general practice. At these locations, the conditions are seen quite differently than what is seen in general practice.

A relatively recent retrospective study from England looked at the incidence of murmurs in dogs that were presented to primary care facilities. The results showed that murmurs were present in about 3.5% of dogs, with the greatest majority of murmurs likely caused by endocardiosis.

(continued on page 20)

SPECIAL FEATURE

Lyme Disease: Experts Weigh in on the Controversies

By Nicola M. Parry, BVSc, MRCVS, MSc, DACVP, ELS

Lyme disease (caused, in North America, by the spirochete Borrelia burgdorferi sensu stricto) is the most frequently reported vector-borne disease in humans and dogs in the United States.

The number of Lyme disease cases in people in the United States has tripled over the past 20 years. Notably, Ixodes scapularis and Ixodes pacificus—the 2 tick species that most commonly transmit the disease to people and dogs—

(continued on page 20)

ACVC

Lymphoma in Cats: An Update

At the 2016 Atlantic Coast Veterinary Conference, Laurel Williams, DVM, DACVIM (Oncology), who practices at Veterinary Specialty Hospital of the Carolinas, and is an adjunct professor at NCSU Veterinary School, gave an update on feline lymphoma. She was enthusiastic about treating cats with lymphoma even though she acknowledged that dogs with the disease tend to have a more complete response to treatment.

(continued on page 9)

CVC

Managing Skin Growths in Dogs and Cats

Cutaneous and subcutaneous masses are very common in companion animal practice, and some veterinarians have become accustomed to monitoring growths that are small or slow growing and postponing surgery until the mass becomes larger. According to veterinary oncologist Sue Ettinger, DVM, DACVIM (Oncology) (also known as Dr. Sue Cancer Vet [DrSueCancerVet.com],

(continued on page 8)

BUSINESS AND PRACTICE MANAGEMENT

Generation Gaps: Can’t We All Just Get Along?

Despite many YouTube videos showing otherwise, we all know that cats and dogs really can get along. And even though it may seem otherwise, the same holds true for Baby Boom, Generation X, and Millennial generations.

Today’s veterinary practice teams are diverse. In fact, it is not unusual to have
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SPECIAL FEATURE

14 Lyme Disease: Experts Weigh in on the Controversies
By Nicola M. Parry, BVSc, MRCVS, MSc, DACVP, ELS

Diagnosis and treatment of Lyme disease remain equally controversial in dogs and people. Infectious disease specialists offer insight and perspective on this confounding disease.
CHAIRMAN’S LETTER

THE REWARDS OF UNITY

Thirty-one years ago last month, we lost the Space Shuttle Challenger and its 7 crew members. An associate of mine remembers Mission Specialist Col. Ellison Onizuka speaking at his high school months before the Challenger mission. To that gymnasium full of teens in serious need of motivation, Onizuka spoke of dreaming big in his home state of Hawaii, and how that, along with perseverance, led to a distinguished career in the military and the honor of being selected for a shuttle mission.

Tragic events can break our collective heart, unite us, strengthen our resolve and, ultimately, drive us onward. Strength and persistence are key American attributes, but collaborative effort is critical to success.

I think most Americans would agree that we have experienced an especially politically divisive time for too long, and it has impeded progress. Many at home and around the world are wondering whether Americans will be able to come together to move forward. Do we still have the right stuff? The answer is yes if we can realize our common ground and focus on unifying tasks like the one Abraham Lincoln proposed to a deeply divided nation in his Gettysburg Address.

It is rather for us to be here dedicated to the great task remaining before us ... that government of the people, by the people, for the people, shall not perish from the earth.

—Abraham Lincoln, The Gettysburg Address

This year, as we fully introduce American Veterinarian™ to practitioners around this great country, we’re celebrating and fostering unity by bringing you a broader view of the profession—one that we hope will unite all veterinarians in the shared goal of providing the best possible care for your patients. We’ll enable this expansive view by providing copious conference news and information both in print and online that you can use in your practice. In addition to major venues, we’re covering regional, state, and local conferences so that veterinarians like you can stay abreast of what is happening in the field throughout the country, from clinical news and trends to product information and state-specific happenings that may soon affect your practice.

What’s more, we’ll highlight our shared scientific and medical roots with commentary and insights from our physician colleagues. Medicine is the same, no matter what species you treat; and we have many commonalities and differences to explore.

What actions are you taking to promote unity with its larger perspective? Practice it and reap its rewards—in your hospital and your community. We will be asking for your pioneering ideas on social media. The stories of Americans such as astronaut Ellison Onizuka teach us that so much is possible when we

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Thank you for reading.

Mike Hennessy, Sr.
Chairman and CEO
Geographic Patterns of Antimicrobial Resistance in Companion Animal Urinary Tract Infections in Europe

By Laurie Anne Walden, DVM, ELS

In an analysis of bacteria isolated from canine and feline urinary tract infections (UTIs) in Europe, antimicrobial resistance was found to be generally more prevalent in southern Europe than in northern Europe. Stricter regulations on veterinary antimicrobial use in certain countries may explain the difference, according to authors.

Antimicrobial resistance in companion animals is a public health problem as well as a challenge for veterinary practitioners, say the authors. “... [T]hese pathogens may be zoonotic and companion animals may play a role in the spread of resistant bacteria due to their close contact to humans,” they write. “This work... reinforces the need for strategies aiming to reduce resistance.”

The multicenter retrospective study included data from 15,097 positive urine cultures in dogs and 5963 positive urine cultures in cats, yielding 22,256 bacterial isolates. The data were collected by 16 veterinary microbiology laboratories in 14 countries between 2008 and 2013. Susceptibility testing methods varied from country to country.

The most common isolate in canine and feline samples was Escherichia coli, accounting for over half of all bacteria found in urine cultures. The next most common isolates in dogs were Proteus and Staphylococcus; in cats, the next most common were Staphylococcus and Enterococcus.

The investigators examined the resistance patterns of E. coli and Proteus species within individual countries from 2012 to 2013. In general, northern countries had the lowest overall prevalence of antimicrobial resistance; southern countries had the highest.

The low prevalence of resistance in certain countries is probably due to strict regulations on antimicrobial prescribing for companion animals and surveillance of antibacterial resistance, according to the authors. “Such strategies could be useful in aiming the reduction of antimicrobial resistance in the Southern countries,” they write.

Nearly half of E. coli and half of Proteus isolates from Portugal were resistant to amoxicillin-clavulanate. In contrast, fewer than 3% of E. coli isolates from Denmark were resistant. The authors recommend further investigation to determine whether amoxicillin-clavulanate is an appropriate empiric antibiotic choice for dogs and cats with UTIs in southern Europe.

The percentages of E. coli isolates resistant to third-generation cephalosporins were highest in Portugal, Italy, and Spain. One-third of Proteus isolates from Portugal were resistant to third-generation cephalosporins. Northern countries had the lowest percentages of resistant E. coli and Proteus species. The authors note that “prudent use” of third-generation cephalosporins is crucial because these drugs are also of great importance in human medicine.

The percentages of E. coli, Proteus species, and Staphylococcus species resistant to fluoroquinolones were higher in this study than in previous reports. This result is troubling, say the authors, because fluoroquinolones are typically used as first-line treatment for pyelonephritis and should be reserved as a second choice for other infections.

Several study limitations are noted by the authors. The differences in susceptibility testing methods among the laboratories complicated comparisons between countries. Because the study was retrospective, no information about patients’ prior antimicrobial treatment was available. Samples submitted for testing were more likely to come from patients with complicated UTIs than from those with uncomplicated UTIs that were treated empirically; this could have caused a bias toward resistance.

The authors suggest that a European surveillance network should collate clinical and antimicrobial resistance data in veterinary patients, with the goal of developing evidence-based antimicrobial use guidelines. They recommend that antimicrobial resistance be monitored in Europe in companion animals, as it is in food animals, to control the spread of resistance.

A Better Understanding of Inclusion Body Disease in Boas and Pythons

By Kerry Lengyel

Inclusion body disease (IBD) is a serious, incurable viral infection of boid snakes—pythons and boas—that has been recognized since the mid-1970s. A new study published in The Veterinary Journal explores IBD and may help veterinarians better protect and care for boid snakes.

IBD is caused by a reptarenavirus that progresses more rapidly in pythons than in boas, but signs of the disease are fairly similar in both species. Clinical signs are variable and can include tremors, abnormal shedding, anorexia, clogged nostrils, pneumonia, paralysis, the inability to strike or constrict, and disorientation. Snakes with the disease can be found stargazing or unable to right themselves when turned over on their backs.

The current strategy for facing IBD involves identifying and isolating affected snakes, but definitive diagnosis is difficult and the infection can spread to other snakes before signs of illness and chronic disease develop.

The study team included researchers from the University of Florida, Colorado State University, and the University of California, San Francisco. The team discovered many boas that are classified as healthy not only may have the reptarenavirus but may also have subclinical IBD.

After testing 131 snakes, the researchers discovered that 19% had IBD. Of those affected, 87% remained clinically healthy. This discovery can help those with reptile collections understand that snakes with IBD can be asymptomatic, which can benefit the other snakes in the collection.

In addition to gaining a better understanding of the subclinical nature of IBD, the development of new diagnostic tests was a major finding. Before the study, infectious IBD was not well understood, but these findings have the possibility of better informing veterinary teams and creating a healthier environment for boas and pythons.
**Pet Obesity Continues to Climb**

By **Kerry Lengyel**

More than 50% of cats and dogs in the United States are overweight or obese, according to the Association for Pet Obesity Prevention, and rates are on the rise. Moreover, a large majority of pet owners don’t realize that their obese pets are in fact overweight. According to Nationwide (formerly Veterinary Pet Insurance), the largest provider of pet health insurance in the nation, the number of obese pets in the United States is increasing for the sixth year in a row. The CDC estimates the total annual medical cost for cat-scratch disease in the United States to be $9.76 million.

“[Cat-scratch disease] causes a substantial burden of disease nationwide and disproportionately affects children,” write the authors. The disease is caused by the bacterium *Bartonella henselae*, which is spread among cats (the reservoir species) by fleas. Humans become infected by cat scratches and bites. A typical symptom in humans is lymphadenopathy near the site of a cat scratch; systemic disease can also occur.

The CDC analyzed data collected from a large medical insurance claims database from 2005 to 2013. The database included information from employer-sponsored health insurance claims for people under 65 years of age. The number of enrollees per year ranged from about 16 million to 53 million.

Over the 9-year study period, 13,273 patients (of over 280 million person-years analyzed) received a medical code for cat-scratch disease as a primary or secondary diagnosis. Of these, 12,735 were treated as outpatients and 538 were admitted to the hospital. The CDC calculated the average incidence per year to be 4.5 outpatients and 0.19 inpatients per 100,000 population.

Nearly one-third of the cat-scratch disease diagnoses were in children aged 14 years or younger. The incidence in children 5 to 9 years of age was 9.0 cases per 100,000 population. Women and girls received 62% of outpatient diagnoses and 55.6% of inpatient diagnoses.

More diagnoses were made in January than any other time of year, followed by August through November. The authors have no explanation for the January peak. They theorize that adoption of cats and kittens during the holidays or increased time spent indoors with cats during the winter school break could be responsible, but they note that no data are available to support these hypotheses.

Outpatient diagnoses of cat-scratch disease decreased over the study period, although hospital admissions remained relatively stable. The authors suggest that the decrease could be related to the development of more effective flea control products for cats or improved diagnostic capability for other causes of lymphadenopathy (resulting in fewer false diagnoses of cat-scratch disease). The overall incidence of hospital admissions in this analysis was lower than that reported in other studies. The authors note that the exclusion of patients 65 years and older from the database could have affected this calculation.

Study limitations listed by the authors relate to the nature of the database. Medical codes for cat-scratch disease could have been entered in error, and certain population segments are excluded. The authors also note that the calculated annual cost of the disease could be an underestimate because it does not account for lost work time or medical visits that did not receive the appropriate code.

To reduce the risk for cat-scratch disease, the authors recommend controlling fleas in cats, practicing good hygiene after handling cats, restricting outdoor hunting by cats, and educating cat owners.

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**MOST COMMON OBESITY-RELATED CONDITIONS**

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<tr>
<th>Dogs</th>
<th>Cats</th>
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<tr>
<td>1. Arthritis</td>
<td>1. Bladder/urinary tract disease</td>
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<td>2. Bladder/urinary tract disease</td>
<td>2. Chronic kidney disease</td>
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<tr>
<td>3. Low thyroid hormone production</td>
<td>3. Diabetes</td>
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<tr>
<td>4. Liver disease</td>
<td>4. Asthma</td>
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<tr>
<td>5. Torn knee ligaments</td>
<td>5. Liver disease</td>
</tr>
<tr>
<td>6. Diabetes</td>
<td>6. Arthritis</td>
</tr>
<tr>
<td>7. Spinal disk disease</td>
<td>7. High blood pressure</td>
</tr>
<tr>
<td>8. Chronic kidney disease</td>
<td>8. Heart failure</td>
</tr>
<tr>
<td>10. Fatty growth</td>
<td>10. Spinal immobility</td>
</tr>
</tbody>
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Nationwide compiled a list of the top 10 dog and cat obesity-related conditions.
AVMA Weighs in on Pet Supplement Use in the United States

By JoAnna Pendergrass, DVM

In 2015, consumer market research company Packaged Facts published its fifth report on pet supplement use in the United States, identifying current and future trends in the market. The report included several key insights:

- One-third of dog owners give their pet supplements.
- One-fifth of cat owners give their pet supplements.
- Two-thirds of pet owners purchase supplements through their veterinarian, although the frequency of veterinary consultation is unclear.
- Joint health supplements are the most common type of pet supplement purchased by pet owners.

The report indicated that pet owners spent approximately $541 million on pet supplements in 2014. For several reasons, the pet supplement market has not experienced significant gains in recent years. First, increased interest in pet supplements has not led to increased product sales. Second, pet owners are beginning to prefer nutraceutical treats (e.g., soft chews) over traditional supplement formulations (capsules, tablets, powders). Third, given the lack of clinical evidence supporting pet supplement use, veterinarians are more likely to prescribe medications than supplements.

In response to these challenges, makers of pet supplements are now looking to mimic the techniques used to market human supplements. They are also developing more palatable and enticing supplement formulations.

AVMA WEIGHS IN

Previously, the American Veterinary Medical Association (AVMA) developed a policy on glucosamine. However, the AVMA Board of Directors rescinded this policy in 2016. The AVMA Council on Biologic and Therapeutic Agents (COBTA) and Clinical Practitioners Advisory Committee recommended rescinding this policy because “advocating for enforcement discretion for unapproved drug products based on a long history of use without significant safety concerns, but without efficacy data, does not reflect the AVMA’s science-based perspective.”

Although the glucosamine policy is now defunct, the AVMA has maintained its policy regarding the Dietary Supplement Health and Education Act of 1994. This act, which mandates the wording that must be included on human supplement labels, does not apply to animals; the policy states AVMA’s belief that “the act should not be modified to include animals.”

Pet supplement regulation continues to cause confusion. In a news release, Dr. David A. Dzanis, secretary of the American College of Veterinary Nutrition and CEO of Regulatory Discretion Inc., explained that some supplements (vitamins, minerals) are regulated as food; others, such as herbs and metabolites, are classified as either unapproved food additives or unapproved animal drugs. Dr. Lisa M. Freeman, a clinical nutrition professor at Tufts University’s Cummings School of Veterinary Medicine, expressed concern that unclear regulations raise questions on the safety, dosage, and quality control of pet supplements. Despite the need for clearer regulations, time and money pose significant challenges to gaining approval of supplements as food additives or animal drugs, Dr. Dzanis said.

In addition to unclear regulations, the clinical efficacy of pet supplements remains a concern. As Dr. Freeman noted, although some supplements may provide clinical benefit, many others “have absolutely no effect or have potential harm.” For example, glucosamine could disrupt glucose regulation or cause digestive upset in some animals.

Given the questions surrounding regulatory and clinical efficacy of pet supplements, Drs. Freeman and Jennifer L. Burns, who sits on COBTA, provided recommendations for veterinarians in clinical practice:

- Conduct a thorough nutritional assessment during each visit.
- Use evidence-based medicine when evaluating supplements.
- Take the lead role in recommending supplements to clients.
- Recommend supplements that have undergone independent quality-control testing.

Horses Use Various Signals to Ask Humans for Help

By JoAnna Pendergrass, DVM

A study recently published in Animal Cognition reported that, when faced with an unsolvable problem, horses will seek human attention and help through visual and tactile signals.

Social communication skills are important in the animal world. Chimpanzees are especially skilled at social communication, demonstrating the ability to discern the knowledge states (knowing versus not knowing) and attention states (seeing versus not seeing) of other individuals. Through domestication, it is thought that some animals, such as dogs and horses, have developed strong social communication skills with humans.

Horses have played important roles in human society, from transportation to companionship, since their domestication 6000 years ago. Previous studies have reported that horses are aware of a human’s attention state. However, little scientific research has been done to analyze how horses communicate with and respond to a human’s knowledge state.

Researchers at the Kobe University Graduate School of Intercultural Studies in Japan conducted a 2-part experiment using 8 horses and their caretakers. In each part, a research assistant hid carrots in a bucket that was accessible to the caretaker but not the horse; the bucket’s inaccessibility was the horse’s unsolvable problem. In part 1, the caretaker knew where the carrots were hidden; in part 2, the caretaker knew where the carrots were hidden.

In part one of the experiment, researchers observed the horses looking at, touching, and lightly pushing their caretakers. In part two, the horses did not use as many visual or physical cues to seek human help and attention.

Results suggest that horses have high social cognitive skills with humans. In the study, the horses could not only discern whether their caretakers knew where the carrots were hidden, but they also adjusted their communicative behaviors accordingly. These social cognitive skills may have developed when humans domesticated horses.

Future studies will continue to analyze horses’ social cognitive skills with humans. As noted in a press release about the findings, gaining more insight into how horses communicate with humans will provide insight into “the development of unique communication traits in domesticated animals.”

AmericanVeterinarian.com
Managing Skin Growths in Dogs and Cats

By Karen Todd-Jenkins, VMD

SEE SOMETHING, DO SOMETHING.

Dr. Ettinger promotes a cancer awareness program called “See Something. Do Something: Why Wait? Aspirate.” “See SOMETHING. Do SOMETHING” (SSDS) is a joint program with VCA that offers guidelines to promote earlier detection and intervention in managing skin masses. According to SSDS, if a skin growth has been present for 1 month and is 1 cm in diameter (about the size of a pea), it should be aspirated or biopsied. Dr. Ettinger notes that “in veterinary medicine, most skin and subcutaneous tumors can be cured with surgery alone if diagnosed early when tumors are small.”

Notes Dr. Ettinger, “The SSDS recommendations are helpful because definitive guidelines about when to aspirate or biopsy skin tumors in companion animals are lacking.” It is generally accepted that a rapidly growing skin mass that is changing in appearance, painful, or irritating to the patient should be addressed as soon as possible. But slow-growing tumors are not always held to the same standard. Dr. Ettinger warns that long-term monitoring of these masses can allow them to progress and may require a more extensive or more invasive surgical procedure. It can also reduce the possibility of complete resection, increasing the likelihood of recurrence or the need for additional postoperative treatments. Dr. Ettinger notes that if small tumors are detected early, identified appropriately, and removed completely (ie, with clean surgical margins), further treatment is not required in most cases, improving long-term patient outcomes.

Early, presurgical diagnosis is an important component of SSDS. This can be accomplished either through fine-needle aspiration and cytology or through tissue biopsy.

DIAGNOSTIC METHODS

Fine-Needle Aspiration and Cytology

Dr. Ettinger says fine-needle aspiration and cytology is advantageous because, compared with biopsy, it is minimal invasively, relatively inexpensive, and can be performed during a regular outpatient visit. It can help distinguish tumors from inflammation, and some tumor types, such as lipomas, are identified using this method. Cytology results are sometimes inconclusive, necessitating biopsy to obtain a definitive diagnosis. Clinicians are advised that any aspirate sample that does not consist exclusively of fat (lipoma), cyst fluid, or cellular debris should be submitted to a diagnostic lab for evaluation by a trained cytopathologist.

Biopsy

Dr. Ettinger says tissue biopsy can be used for initial tumor identification or to clarify an inconclusive cytology result. Performing a biopsy before tumor removal is recommended because it helps determine a treatment plan. Some veterinarians forgo presurgical biopsy of a skin mass and perform an excisional biopsy. This has the advantage of treating the problem (removing the tumor) and obtaining a diagnosis (via histopathology) at the same time.

However, Dr. Ettinger cautions that this approach is not ideal because recommended surgical margins vary among tumor types, so additional surgeries and/or follow-up radiation or chemotherapy may ultimately be required to treat the growth. Some malignant growths require 2- or 3-cm surgical margins, so forgoing a presurgical biopsy increases the likelihood of incomplete resection, which may necessitate additional surgeries or other follow-up treatments. “Research confirms that the first surgery is the patient’s best chance for a cure,” Dr. Ettinger says. “The goal of SSDS is that the first surgery is the only surgery for the patient.”

TREATMENT PLANNING AND TUMOR RECURRENCE

Under SSDS guidelines, once a tumor type has been confirmed, the optimal treatment can be explored. Dr. Ettinger cautions that not all benign tumors require surgical resection. If, perhaps due to location, removing the growth when it becomes larger would complicate complete removal, then early excision is recommended. Similarly, if a benign growth is bleeding or causing pain, infection, or irritation, surgery is recommended. Veterinarians may elect to monitor growths that would require extensive or complicated surgery to remove. However, SSDS guidelines recommend that the pet should be re-evaluated by the veterinarian every 3 to 6 months, and the mass should be measured each time, not merely visually assessed.

Dr. Ettinger also recommends that if biopsy or cytology confirms a malignancy, clinicians should consult a veterinary oncologist for staging and treatment recommendations. Patients at risk for recurrence of skin growths can also benefit from SSDS recommendations. In these patients, pet owners and veterinarians both have important roles:

• Pet owners should check their pets each month, noting the size and location of any growths.
• Evaluate all growths via fine-needle aspirate and cytology.
• Biopsy can be performed if cytology results are inconclusive.

Facilitating early detection of regrowth or metastasis can increase the chance of a better outcome.

SUMMARY

Whether dealing with a new growth or a recurrent one, Dr. Ettinger advises a proactive approach to skin tumors, as early detection and intervention can save lives.
Lymphoma in Cats: An Update

By Beth Thompson, VMD

(continued from front cover)

Historically, cats develop lymphoma at a higher rate than other species, and it remains the most common hematopoietic cancer in cats. However, she notes that the decline in the overall incidence of feline leukemia virus (FeLV) and feline immunodeficiency virus (FIV) has led to a decrease in the amount of lymphoma we see today.

She stated that about 25% of FeLV-positive cats will develop lymphoma, with presenting signs showing up at about 3 years of age. An older age at presentation (around 7 years) is more common for FeLV-negative cats. FeLV infection increases the risk of getting the disease. That risk increases even more for cats concurrently infected with FIV. One study demonstrated that FeLV-positive cats are 60 times more likely to get lymphoma and FIV-positive cats are 6 times more likely to get lymphoma. Cats concurrently infected with FeLV and FIV are 80 times more likely to get lymphoma.

In dogs, lymphoma is a visual presentation, with patients often showing clear signs of lymphadenopathy. In cats, the disease is internal and is referred to by the anatomic site affected. Staging is more straightforward in dogs than it is in cats.

TYPES OF LYMPHOMA

Most Common Presentations

Multicentric lymphoma is usually seen in middle-aged and older FeLV-negative cats. The clinical presentation and physical exam findings vary with the organs affected (liver, spleen, lymph nodes).

Gastrointestinal (GI) lymphoma typically affects older FeLV-negative cats. These cats can present with anorexia, vomiting, diarrhea, weight loss, and sometimes lymph node involvement. A palpable abdominal mass may be detected.

Other Presentations

Mediastinal lymphoma is seen less frequently and often appears in younger, FeLV-positive cats. Pleural effusion is common, resulting in clinical signs of dyspnea and tachypnea. Physical exam may reveal a noncompressible anterior mediastinum.

Renal lymphoma affects middle-aged cats. Both FeLV-positive and FeLV-negative status are seen. These cats generally have bilateral renomegaly and present with acute renal failure. Clinical signs include polyuria/polydipsia or anuria, anorexia, and lethargy. Dr. Williams stressed that if renal lymphoma is treated successfully, then kidney failure will resolve; therefore, renal failure should never be used as a reason for not treating renal lymphoma. Interestingly, recurrence of renal lymphoma often affects central nervous system tissue.

Spinal lymphoma was the most common cause of hindlimb paresis 15 years ago. At that time about 85% of the cases were FeLV positive. Today, the most common cause of hindlimb paresis is saddle thrombus. It’s impossible to use radiographs to diagnose spinal lymphoma, but 70% of cases will have concurrent bone marrow involvement. If you suspect spinal lymphoma, it’s worth doing a bone marrow aspirate and, of course, computed tomography.

Nasal lymphoma affects middle-aged to older cats and is unique in that it is a localized disease. Clinical signs include nasal discharge, epistaxis, upper respiratory signs, and facial deformity. Cytology is usually sufficient for diagnosis, and histopathology can differentiate between high-grade (lymphoblastic) and low-grade (lymphocytic) tumors. The phenotype (B cell versus T cell) appears to make no difference in results. The best treatment is 4 weeks of radiation therapy with or without systemic chemotherapy. Results are usually good, with the median disease-free interval at approximately 1.5 years. Disease-free intervals of more than 26 months are possible.

STAGING AND TREATMENT

Staging ideally consists of a complete blood count, chemistry screen, bone marrow aspiration, urinalysis, thoracic radiographs, and abdominal radiographs/ultrasound. Depending on location, cytology can yield the diagnosis, although histopathology is needed to determine tumor grade. High-grade or lymphoblastic lymphoma is more common and is associated with acute onset and rapid progression. Low-grade lymphocytic tumors have a more chronic onset, and progression is seen most often with GI involvement.

Because lymphoma in cats is in generally considered a systemic disease, it is best treated with combination chemotherapy. Single-agent chemotherapy is not as effective. Treatment with prednisolone will elicit partial remission in 65% of patients and disease-free intervals of 2 to 3.5 months. Using only doxorubicin for treatment, complete remission rates hover at 25% to 30% with disease-free intervals of 3 to 7.5 months. Better results are possible with, for example, a regimen of COP (cyclophosphamide, Oncovin, and prednisolone) plus doxorubicin, with 50% of cats having complete remission lasting around 9 months.

Minor differences between chemotherapy protocols suggest that manipulations of agents and scheduling are unlikely to yield significant improvements. Combining with other modalities may prove beneficial.

Nasal lymphoma is very responsive to radiation, which may also have a place in treating other types of lymphoma. More research is needed to determine optimal fractionalization. In 2010, Dr. Williams published a study in which chemotherapy was combined with radiation treatment in 8 cats with GI lymphoma. The radiation dose was kept low to avoid kidney damage. Cats were required to be in remission as criteria for inclusion. Six weeks of induction chemotherapy was followed by abdominal cavity radiation. Response rates were 30% to 70%, and the treatment was well tolerated. Five cats were alive and in remission after 9 months. Although the selection of cats in remission represents a bias, adding radiation made for fewer visits and decreased expense.
### Clinical Signs of Feline Hyperthyroidism

- Palpable thyroid gland (80% of cases)
- Muscle atrophy and weight loss
- Diarrhea
- Vomiting
- Polyphagia
- Polyuria/polydipsia
- Hyperactivity
- Weakness
- Irritability
- Poor hair coat
- Matting and very long nails
- Tachycardia
- Cardiac arrhythmias/cardiac disease
- Hypertension (15%–20% of cases)

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### Imaging

Radiographically, 20% to 30% of hyperthyroid cats display cardiomegaly, although less than 5% have radiographic evidence of heart failure. The advanced age of these patients makes comorbidity common, so Dr. Levitan suggests looking past the thyroid for concurrent disease. She has seen several cats with inflammatory bowel syndrome, lymphoma, and other conditions that either presented as if they were hyperthyroid or were also hyperthyroid.

Scintigraphy is the gold standard to identify mild or occult hyperthyroidism because it clearly identifies active thyroid tissue and quantifies disease in mild or occult cases; it also provides valuable information in the diagnosis and evaluation of thyroid carcinoma.

Ultrasound studies are limited by the area examined and by the skill of the sonographer. Inexperienced sonographers can easily mistake a lymph node or blood vessel for thyroid tissue.

### Laboratory Testing

Thyroid testing yields straightforward results when serum total thyroxine (TT₄) and free thyroxine (fT₄) concentrations are high and thyroid-stimulating hormone (TSH) values are low. In cases of thyroid carcinoma, TT₄ numbers are 4 to 15 times higher than normal.

What about the patient that is clinically hyperthyroid but has a normal TT₄ and a normal to high fT₄? Such cases of occult or subclinical hyperthyroidism are common, but their significance is not yet clear.

Serum TT₄ is a very good test for cats, although levels may vary day to day. There is only a 2% rate of false-positive results when the equilibrium dialysis method is used. An elevated serum TT₄ level in a cat with clinical signs of hyperthyroidism gives an extremely specific diagnosis.

In cases of early hyperthyroidism or concurrent disease, TT₄ can be in the normal or high-normal range. Suspicious cases that have a normal TT₄ should be retested on another day. In addition, normal ranges of TT₄ can be misleading, as what’s considered “normal” changes with age and with the lab used. Older cats without hyperthyroidism naturally have low or low-normal TT₄ levels. Therefore, a high-normal result may indicate hyperthyroidism. Veterinarians should also take into consideration that about 10% of hyperthyroid patients will have normal TT₄ levels.

False-positives, although rare, are seen. Up to 30% of cats presenting with high-normal TT₄ concentrations turn out to be euthyroid, even when sometimes coupled with elevated fT₄ levels.

Total tri-iodothyronine (T₃) is not a very helpful test in cats. Even in mild or occult cases, 80% of patients will have normal results. Serum fT₃ is a more sensitive test than TT₄ or T₃, and the results are less likely to be affected by other factors. However, an elevated fT₃ without an elevated TT₄, a palpable nodule, or other presenting signs is unlikely to be clinically significant. Because it is a more sensitive test, it is also less specific, and false-positives occur in up to 25% of cases. For this reason, Dr. Levitan suggests always running TT₄ and fT₄ concurrently at the same laboratory.

Serum TSH is difficult to detect at low levels. Because veterinarians expect low levels in these patients, the test is not helpful unless results are normal or elevated, in which case hyperthyroidism can be removed from the differential diagnosis. Dr. Levitan reminds veterinarians that TSH is a highly sensitive but not very specific test, and 60% to 70% false-positive rates make it of little use.

### Treatment

Generally, therapy for feline hyperthyroidism falls into one of three categories: medical, surgical, or radioactive iodine treatment. Conjointive, alternative, and diet therapies are also available, some of which are more helpful than others (Table). Management and treatment options should be tailored to the patient’s and owner’s needs and...
resources, while medical and dietary options should be tried and tested. Radioactive iodine is the gold standard of treatment but may be less than ideal for some patients and prohibitively expensive for some owners.

Medical Therapy
Both methimazole and carbimazole block the synthesis of thyroid hormones. Dosing should start with 2.5 mg divided twice daily; patients should be monitored. The dose may be increased over time as the growing thyroid tissue produces more hormone. The recommended starting dose used to be higher, but experts now advise starting lower and increasing as needed.

The doses are great for stabilizing a patient prior to surgery or radioactive iodine treatment. They can also be used as a trial to look for underlying renal disease. Veterinarians should be careful; if they make the cat hypothyroid, its kidney function will be impaired. Adverse reactions occur in 20% of treated cats and usually develop within the first 3 months of therapy. Uncommon reactions include facial itching and excoriation, blood dyscrasias, and hepatopathy. More frequent reactions are anorexia, diarrhea, lethargy, and vomiting. Carbimazole is metabolized to methimazole; therefore, a cat that has had a reaction to one drug cannot be switched to the other.

Two to 4 weeks after starting treatment, repeat a complete blood count, chemistry screen, urinalysis, and TT₄ ensuring that bloodwork is drawn 6 hours after medication has been administered. The dose should be modified to achieve values in the mid-normal range. If hypothyroidism is suspected, a full thyroid panel should be submitted. If a low TT₄ and fT₄ are coupled with a high TSH, iatrogenic hypothyroidism has occurred and the methimazole dose should be decreased.

Surgery
Thyroidectomy was the ideal treatment for many years. Risks include laryngeal paralysis, voice change, Horner’s syndrome, hypoparathyroidism, and temporary or permanent hypothyroidism. Inadvertent destruction of the parathyroid gland can severely depress calcium levels. Recurrence is possible. Surgical patients require postoperative calcium monitoring and biannual thyroid testing.

Radioactive Iodine
Dr. Levitan expects longer median survival times following radioactive iodine treatment compared with medical treatment. She advises caution regarding where to send patients, however, as some facilities give the same dose to all cats. She recommends using quantitative scintigraphy to tailor the dose to each individual patient. The advantage of radioactive iodine treatment is that parathyroid and atrophied normal thyroid cells are spared, thereby better preventing the potential long-term hypothyroidism and hypoparathyroidism risk associated with surgery.

PROGNOSIS
Dr. Levitan is optimistic about the prognosis for hyperthyroid cats with appropriate treatment. She cautions that overtreatment of hyperthyroidism leads to hypothyroidism, the signs of which may not be evident immediately. Veterinarians should continue to monitor patients for life. If hyperthyroidism is suspected, conduct a complete thyroid profile. Findings of low T₄ and fT₄ along with high TSH levels indicate iatrogenic hypothyroidism.

References available at AmericanVeterinarian.com.

Table. CONJUNCTIVE, ALTERNATIVE, AND DIET THERAPIES

<table>
<thead>
<tr>
<th>TREATMENT</th>
<th>PURPOSE</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>β-blocker (atenolol)</td>
<td>Control tachycardia and blood pressure</td>
<td>Do not use in patients with heart failure.</td>
</tr>
<tr>
<td>Stable iodine</td>
<td>Destroy hyperactive tissue</td>
<td>Some advocate the use of large doses to block thyroid hormone synthesis and release, but Dr. Levitan has found that the effects are erratic and short-lived; therefore, she does not recommend its use.</td>
</tr>
<tr>
<td>Calcium ipodate and iopanoic acid</td>
<td>Decrease serum TT₄ production</td>
<td>Clinical improvement is seen in 60% of cases, but effects wane after 3 months; a viable option for the presurgical/radiation period but expensive and ineffective long term.</td>
</tr>
<tr>
<td>L-carnitine</td>
<td>Reduce clinical signs</td>
<td>Does not affect circulating TT₄ and T₃; do not use D-isomer of carnitine because it is toxic.</td>
</tr>
<tr>
<td>Bugleweed, lycopus, lemon balm, and Resthyro</td>
<td>Alleviate clinical signs</td>
<td>The products have no effect on thyroid levels and are not viable treatment options.</td>
</tr>
<tr>
<td>Hill’s Prescription Diet y/d Feline</td>
<td>Decrease circulating thyroid hormone levels</td>
<td>Any exposure to iodine from another source, such as well water, treats, prey animals, and human food, will defeat the purpose of the diet. Unpublished data show measurable reversal of signs, although the diet does lower TT₄ levels to the high-normal range.</td>
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DEFINITIVE DIAGNOSIS OF HYPERTHYROIDISM
Hyperthyroidism is a clinical diagnosis and should never be based on lab work alone.

Definitive diagnosis = Suggestive clinical signs + Abnormal lab result + Palpable nodule

The number veterinarians receive from the laboratory is just a number. It is how this number is interpreted that matters. Definitive diagnosis includes the following tests:

- Palpation of a thyroid nodule.
- Thyroid testing
  - Elevated total thyroxine: Follow up if not yet elevated but hyperthyroidism is suspected and there is a palpable thyroid nodule, especially if another illness is present.
  - Free thyroxine: If TT₄ is in the upper 50% of normal resting laboratory ranges, the presence of a high fT₄ is highly specific for hyperthyroidism. Do not use fT₄ alone, as some euthyroid cats have elevated fT₄.
- Scintigraphy is the gold standard, but it is not always practical.

TT₄ = total thyroxine
T₃ = total tri-iodothyronine

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Poultry as Pets: A Fad with Legs?

By Beth Thompson, VMD

(continued from front cover)

The largest rare-breed poultry hatchery in the world, McMurray Hatchery in Webster City, Iowa, sold 1.7 million chicks in 2009\(^1\) and 3 million in 2016.\(^2\) Smaller feed and pet stores also report steady growth.\(^3\) There are even “chicken farmers” who have made pet chickens into a multimillion-dollar business. Just take a look at the profile of MyPetChicken.com founders\(^4\) in Startups magazine’s March 2013 issue. In that same year, the community forum BackYardChickens.com counted 170,000 members—up from 50,000 in 2010 and 25,000 the previous year.\(^5\) That same community has 436,000 members today.\(^6\)

Dr. Matthew Edson, owner of Rancocas Veterinary Associates in Mount Holly, New Jersey, emphasized the need for veterinary care for these animals and urged an interested audience at the 2016 Atlantic Coast Veterinary Conference to join him in treating this underserved population. “Most people want chickens for egg production,” he said, “and a chicken is the first choice of farm animal to own. Therefore, you can expect clients who are inexperienced and who think of their chickens as (usually) outdoor pets.”

BASICS OF POULTRY OWNERSHIP

Dr. Edson noted that most people obtain chickens from feed stores, hatcheries, other chicken owners, or auctions. In his experience, auctions are the worst place to get a pet chicken due to overcrowding and poorer sanitary conditions. A healthy hen from a productive breed will start laying eggs at about 6 months of age and, in the warmer months, will produce one egg per day for about 3 years.

The two primary things people should think about before getting backyard chickens are the ability to house and care for them properly and the legality of keeping them in their backyard, he said. Although many municipalities now allow chickens, zoning laws and ordinances can be confusing. No definitive website references for regulations exist. Obtaining the proper permits may be a frustrating experience because who has final control varies with geographic location. It may reside with a municipality’s public health department, animal control office, inspections department, or even the city clerk. Perhaps, Dr. Edson joked, “the most important factor is the neighbors’ opinion.” He suggests future backyard chicken keepers get buy-in from adjacent property owners before investing too much time or money.

There are many good online husbandry and safety references for the first-time chicken owner. Adequate shelter from the elements (ie, a covered coop), easily cleaned surfaces, and fencing that extends below ground are essential, as is access to clean water. Suggested veterinary references include the textbook Backyard Poultry Medicine and Surgery by Cheryl B. Greenacre and Teresa Morishita, www.cvicammedicine.net, and www.partnersah.vet.cornell.edu, which includes an informative atlas of avian diseases.

Nutritionally, Dr. Edson recommends feeding a commercial poultry diet supplemented with oyster shells and grit. A diet inadequate in selenium can cause feather loss and skin conditions. Make sure the feed doesn’t contain ionophores as they may pose a danger to other mammals (particularly horses) if ingested. He discourages feeding chickens broken eggs, which could lead to them attacking their own eggs, and suggests keeping table scraps to a minimum. The feed should be kept in secure cans to keep it dry and fresh and discourage rodents.

PHYSICAL EXAMINATION

Physical exam of a chicken starts with general appearance and behavior. After that, perform a systematic check from beak to tail. The eyes and nares should be free of discharge. Look in the mouth and at the skin and feathers, paying special attention to the base of the feathers. Palpate the crop to check for impaction or excess flaccidity and the keel to determine body condition. Slide your hand behind the keel to check the abdomen for fluid and masses (including eggs). Always check the vent with a lubed finger.

Normal temperature for a chicken is 106°F to 107°F. Auscultation is helpful to evaluate respiratory rate (normal is 15 to 20 breaths/minute). Normal heart rate ranges from 260 to 320 bpm, which is generally too fast to characterize the quality of heart sounds.

If you need to take a blood sample, use the median wing vein. Lay the bird on its back and extend the wing; blood can be obtained with a butterfly set. Fecal sampling should be a standard part of the health exam. Dr. Edson gave a brief overview of the most common diseases and disorders seen in chickens in mid-Atlantic veterinary practices.

COMMON DISEASES AND DISORDERS

Parasites

Among the most common external parasites Dr. Edson sees are lice. Immature nits or adult lice are found on feather shafts and are easily visible at the bottom of the shaft near

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**CHICKENS AS FOOD ANIMALS**

Chickens may be kept as pets, but the government considers them food. Therefore, veterinarians must comply with the Animal Medicinal Drug Use Clarification Act (AMDUCA) regarding label and extralabel drug use, Dr. Edson warned. Extralabel drug use means “actual use or intended use of a drug in an animal in a manner that is not in accordance with the approved labeling. This includes, but is not limited to, use in species not listed in the labeling, use for indications (disease or other conditions) not listed in the labeling, use at dosage levels, frequencies, or routes of administration other than those stated in the labeling, and deviation from the labeled withdrawal time based on these different uses.”

In accordance with AMDUCA, veterinarians can consult Food Animal Residue Avoidance Databank (FARAD) at farad.org/eldu/elduman.asp. Resources regarding drug use in poultry can also be found at AVMA.org. Dr. Edson reminded attendees that group I drugs are never allowed to be used in a food animal species, and group II drugs have restricted extralabel use. In most cases, he said, “You’ll be looking for withdrawal times for eggs. Be aware that there are drugs with no published withdrawal times for personally consumed eggs.” In these cases, his practice asks FARAD for guidance.
the skin. They are also readily transmitted from bird to bird. Treatment is possible with subcutaneous or oral ivermectin. Note that if the eggs are being sold commercially, the only permitted treatment is diatomaceous earth.

Scaly leg mites are another common pest. Leg scales will appear to be lifted, giving the legs a rough appearance. This condition is potentially serious and can lead to digit loss. Treat with 0.2 mg/kg injectable ivermectin, and dip the legs in petroleum jelly to suffocate the mites. Dr. Edson noted that lice live their entire lifecycle on the chicken, but mites do not. Therefore, although environmental cleanup is important with both parasites, it is essential with scaly leg mites. Dr. Edson noted that there are no labeled treatments for most parasitic problems, including scaly leg mites.

Backyard birds can be infected with internal parasites such as Ascaris, Capillaria, Coccidia, and Heterakis spp. Few labeled drugs can be used for treatment, but piperazine, levamisole, ivermectin, and sulafadimethoxine (for coccidia) are a standard part of the arsenal. Tapeworms are uncommon, which is good considering there is no labeled drug for treatment.

Viral Disease
Marek’s disease is very common in backyard flocks and affects only chickens. It is caused by herpesvirus, and there are many different serotypes and strains. The disease can cause T-cell lymphoma, tumors of various organs, ocular lesions, paralysis, and neurologic disease.

It is easily transmitted via air or by direct contact. It can also spread via fomites, making it difficult to remove from the environment. Vaccination of day-old chicks is common and offers about 90% protection, although it doesn’t keep infected chickens from transmitting the disease. Diagnosis can be made by submitting a serum sample to either the National Veterinary Service Laboratory in Ames, Iowa, or the Poultry Diagnostic & Research Center at the University of Georgia in Athens (www.vet.uga.edu/avian).

Respiratory Illness
In New Jersey, Dr. Edson mostly sees respiratory problems secondary to crop disease and resultant aspiration. “But you need to rule out reportable diseases like avian influenza, mycoplasma, and the like,” he said. Infectious upper respiratory disease typically presents with nasal discharge, rhinitis, conjunctivitis, epiphora, and sinusitis. Lower respiratory disease yields more serious clinical signs, such as increased respiratory rate and effort, exercise intolerance, open-mouthed breathing, weight loss, and anorexia. Sounds related to abnormal air movement through the lungs are rarely auscultated. Infectious disease processes involving lung or air sac tissue are typically associated with a significant leukocytosis (more than 3 times normal), which is often accompanied by a relative and absolute heterophilia. Respiratory problems can also result from excess ammonia due to unsanitary coop conditions.

Pododermatitis
Bumblefoot (pododermatitis) can be caused by obesity, unequal weight bearing, abnormal abrasions on the plantar surface of the foot, trauma, or even excessive standing. Infections pododermatitis due to Staphylococcus occurs when environmental conditions are poor. Dr. Edson treats the foot with antibiotic soaks or, in more severe presentations, by removing encased pus and getting a diagnostic swab for culture to prescribe the appropriate antibiotic. Because this is a painful condition, he uses meloxicam at 1 mg/kg to control the discomfort. “You can close the wound if you think you’ve removed everything,” he noted. “Otherwise, leave it open and pack with Betadine pads under a clean wrap.”

Abnormal Egg Production
Salmonella pullorum most frequently affects the ovary. Clinical signs include decreased egg production and infertility. Transmission is primarily transovarian, and young chicks suffer diarrhea and high mortality. They are also capable of infecting other flock members. Surviving chicks can produce infected eggs at maturity and begin the cycle. Bacterial culture is used to diagnose and, because this is a reportable disease, backyard flocks are euthanized under the auspices of state agencies. Egg binding is a painful condition. The owner will describe decreased egg laying and possibly difficulty walking. It can usually be diagnosed on palpation. Hypocalcemia, obesity, and excessive artificial light (especially in young birds) can cause the problem. Treatment consists of analgesia with meloxicam or buprenorphine and egg removal—either manually with soaks and lubrication or with surgical needle decompression. Supplemental calcium gluconate (23%) should be added (1 mL/30 mL water or 5 to 10 mg/kg SC) as needed. Re-examine nutrition and housing practices to ensure proper calcium supplementation and avoid repeated problems.

Behavior
Vent pecking and even cannibalism can be seen in backyard flocks. When it appears, Dr. Edson suggests taking a closer look at the environment and nutrition. “Overcrowding, excessive heat or light, parasite infections, an unbalanced diet, or inadequate food can lead to this behavior,” he said. It is essential to correct the underlying problems to prevent trauma and mortality to flock members.

SUMMARY
Backyard chickens are a trend that shows no signs of lessening. However, backyard flocks can be a public health hazard by harboring or spreading dangerous pathogens like Salmonella to naïve caretakers or creating larger health hazards by establishing pockets of infectious disease that could affect the food supply.

Veterinarians do a great service by caring for these pets, both as individuals and as flocks. Be familiar with these national reportable chicken diseases: highly pathogenic avian influenza; low pathogenic avian influenza (H5 or H7 subtypes); Newcastle disease (exotic); avian infectious bronchitis; infectious bursal disease (Gumboro disease); Marek’s disease; mycoplasmnosis (M. gallisepticum); avian chlamydiosis (psittacosis and ornithosis, Chlamydia psittaci); and pullorum disease (Salmonella pullorum). In addition, individual states require reporting of other diseases, and it is the veterinarian’s responsibility to be informed.

We are just scratching the surface on pet chicken health, and the more veterinarians get involved the better it will be for the chickens and the people who care for them.

References available at AmericanVeterinarian.com.
Lyme Disease: Experts Weigh in on the Controversies

Diagnosis and treatment of Lyme disease remain equally controversial in dogs and people. Here, infectious disease specialists offer insight and perspective on this confounding disease.

By Nicola M. Parry, BVSc, MRCVS, MSc, DACVP, ELS

(continued from front cover)

have extended their geographic range over this time and have now been reported in half of all US counties.\(^{3}\)

Correspondingly, Lyme disease is also becoming an increasing problem for dogs. Typically, infection in dogs occurs more commonly in areas with endemic populations of ticks and where acaricide use is not routine.\(^{6}\)

Despite rising numbers of cases, however, diagnosis and treatment of the disease remain equally controversial in dogs and people. Here, two infectious disease specialists share their perspectives on some important aspects of this disease.

LYME DISEASE: SINGLE INFECTION OR CO-INFECTION?

Co-infection with other organisms is a potential scenario in dogs with Lyme disease, says Annette Litster, BVSc, PhD, FANZCVS, MMedSci, a senior veterinary specialist at Zoetis in Chicago, Illinois.

Dr. Litster says that molecular technology is currently limited in its ability to identify co-infections with other Borrelia species in dogs. “Commercial laboratories need to develop protocols to pick up such co-infections on a test,” she explains. “Or someone in academia has to obtain research funding to do this.”

Nevertheless, she notes that knowing about co-infecting organisms may be of interest only, rather than of clinical importance—until we know what species make a difference to the diagnostic process. “We don’t have that information yet,” says Dr. Litster. Among the numerous barriers to identifying co-infections, she describes how researchers are challenged by currently available diagnostic tests. “Getting the right mix of primers for polymerase chain reaction is not easy,” she says. “And if we use antibody-based tests, are there cross-reactions between different antibodies that we need to be concerned about?”

She also addresses the difficulty of finding antigen in clinical specimens. Typically, because Borrelia migrate to the tissues early after infection, they are scarce in the blood. For diagnostic testing purposes, a tissue specimen—such as a skin biopsy sample from the site of the initial tick bite—is, therefore, more useful than a blood sample, although more difficult to obtain.

According to Raphael Stricker, MD, a tickborne disease specialist from the International Lyme and Associated Diseases Society in Bethesda, Maryland, several co-infections have been identified in cases of Lyme disease in people.\(^{7}\) “In particular, other rickettsias across the country can co-infect and complicate Lyme disease, making it very difficult to treat,” he says.

HOW MANY INFECTED PATIENTS DEVELOP CLINICAL LYME DISEASE?

“We don’t truly know how many Borrelia-infected dogs develop clinical signs of Lyme disease,” says Dr. Litster, “because estimates in the literature are ‘guestimates’ that some experts have made, based on factors that include their case records and background rates.”
However, she discusses findings from the recent Lyme vaccine trial—a robustly designed study in which dogs underwent postmortem examination 90 days after infection. “In this study, 13 of 16 dogs had moderate histologic evidence of joint disease,” she says. “Inflammation was present in each dog in two or more joints. And in 9 of the dogs that inflammation was severe.”

Although the number of Borrelia-infected dogs that develop clinical Lyme disease remains unknown, Dr. Litster thinks it is higher than what is estimated in the veterinary literature. For example, the vaccine trial data found that most Borrelia-infected dogs had histologic evidence of joint inflammation, yet data in the 2006 consensus guidelines published by the American College of Veterinary Internal Medicine state that less than 5% of Lyme-seropositive dogs in one study showed lameness over a 20-month period.

Use of the Lyme vaccine now seems to be reducing the number of clinical cases of Lyme disease in dogs, Dr. Litster notes. However, no real data are available yet to allow comparison of the number of cases that involved clinical signs before and after vaccination, she adds.

Dr. Stricker stresses the huge disparity between reporting of Lyme disease in people and in dogs. According to the Centers for Disease Control and Prevention (CDC), between 2005 and 2014 only three cases of Lyme disease were reported in humans in Colorado.8 By contrast, data indicate that 515 cases of Lyme disease were reported in dogs in Colorado over a rolling 5-year period. “This highlights a serious underreporting in humans,” he says. “I think that dogs are the sentinels of the disease, and we get a much better idea of what is going on with Lyme disease by following these cases as they occur in dogs.”

**LYME DISEASE DIAGNOSTICS**

Although many veterinarians use in-clinic SNAP tests to diagnose Lyme disease in dogs, the biggest headache they face is “what to do with the blue dot-positive healthy dog,” says Dr. Litster.

Due to the lack of data from a well-designed trial with robust study design to evaluate different protocols, Dr. Litster emphasizes that management of the blue dot-positive healthy dog remains subjective. Consequently, veterinarians must examine the available evidence and form their own opinion about how to manage these cases. “Opinions cannot be wrong because the evidence does not yet exist,” Dr. Litster stresses. “Clinicians need to make an informed opinion based on the available science.”

Diagnosis of Lyme disease in humans is also difficult,” says Dr. Stricker. He discusses a gender bias, for example. “Women who develop Lyme disease tend to develop more significant symptoms than men do,” he says, “because the inflammatory response in women is more pronounced.”

By contrast, he adds that “men show a higher rate of positive reactivity on Lyme disease testing than women do. So, men tend to respond more to the infection from a serologic standpoint, whereas women respond more from an inflammatory standpoint.” Therefore, men may show only mild symptoms of Lyme disease but react positively if tested for the disease and thus receive treatment. “Yet women, who may have more symptoms of Lyme disease, often tend to be seronegative and so do not receive treatment,” he says.9

**WHAT ABOUT CHRONIC LYME DISEASE?**

Much controversy exists among MDs about whether chronic Lyme disease truly occurs in people. “Despite the controversy in humans, however, chronic Lyme disease has been documented in dogs,” says Dr. Stricker.

Dr. Litster adds that even some scientists who investigate Borrelia are not confident that Borrelia infection can be eliminated. “Doxycycline probably does not clear the infection,” she says. “But if doxycycline is administered to a dog with a competent immune system, even if the antibiotic does not completely clear the organism from the body, maybe the immune system can keep the organism at bay and prevent clinical disease recurrence.”

**LYME DISEASE TREATMENT**

Dr. Stricker highlights an important disconnect between the pathophysiology of Lyme disease and the treatment approach to it. “The pathophysiology of Lyme disease is very complicated. Borrelia organisms have a complex genome and, as such, it seems that Lyme disease would be very difficult to eradicate. Yet the general treatment approach to Lyme disease seems to be very simplistic,” he says. “Lyme disease is treated with a 2-week course of antibiotics as if it is a disease that is hard to catch and easy to cure. This disconnect is a real problem.”

He also adds that the antibiotics used to treat Lyme disease are 60 years old and not very effective against the disease. With almost 400,000 new cases occurring in people each year, he stresses the need for better treatments. “We need designer drugs like those available for treatment of AIDS and hepatitis C,” he says.

Dr. Litster frequently prefers to use injectable cefovecin sodium to treat Lyme disease in dogs. Although not specifically licensed for Lyme disease, she says it has been shown to be effective against Borrelia species. In addition, a veterinarian who administers this long-acting formulation to an infected dog can be sure that the dog is receiving the appropriate course of treatment to guard against painful arthropathy and fatal nephropathy that can occur in dogs with Lyme disease.

“At least dogs also have some protection against Lyme disease in the form of vaccination and acaricides,” she adds. Neither of these options is yet available for people. Dr. Stricker notes that one Lyme disease vaccine that was used for people was unsuccessful because those who received it developed symptoms of Lyme disease. “And people often don’t use acaricides on themselves,” he adds.

Comparing the situation in human and veterinary medicine, Dr. Stricker concludes that veterinarians take Lyme disease far more seriously in their patients. “Animals will teach us a lot about Lyme disease,” he says. “Ultimately, we need to pay attention to them.”

References available at AmericanVeterinarian.com.
Generation Gaps: Can’t We All Just Get Along?

The generation gap in today’s workforce can be both good and bad. Here we present ways to make generational differences in perspective work in your practice.

By Meredith Rogers, MS, CMPP

(continued from front cover)

multiple generations working side by side. Although all staff members should be viewed as individuals and boundaries between generations are hazy, each period’s economic, political, and social events have shaped beliefs and behaviors enough to enable some generalities to be made.

NEGATIVE EFFECTS OF GENERATION GAPS

The workforce is composed primarily of four generations (Table). Members of each generation have distinct expectations and perceptions about what they want their work environment to provide and how they should behave as employees. Differences in each generation’s approach to work, communication style, and world view can lead to resentment when a person of one generation does not act or speak in a way that is congruent with that of someone from a different generation. According to the Society for Human Resource Management, almost 75% of companies experience some level of generational conflict, and veterinary practices are no exception.¹

Consider these comments you might hear if your practice employs people of different generations:

• **Millennial:** “My boss doesn’t listen to my ideas. I thought it would be a good idea for us to advertise in the local online community newsletter, and she just blew me off.”

• **Generation X:** “When I first graduated I would do anything, no matter how basic, and then ask for more. These new employees expect a raise after 6 months of doing just the bare minimum.”

• **Baby Boomer:** “We have a great receptionist who is engaged in the clinic with both the patients and clients, but he just sits there and won’t participate in our monthly status meetings.”

Intergenerational tension can undermine not only morale among employees in the workplace but also the day-to-day operation of a practice. Veterinary practice success (or failure) is based on two distinct factors: (1) the treatment the practice provides and (2) the smoothness of what happens behind the scenes.

Consider this scenario: Two technicians of different generations do not get along, so it takes them twice the time to obtain an x-ray, which delays you from seeing your next patient and prevents the client from leaving the practice in a reasonable amount of time. The client subsequently posts a bad review on Yelp that is seen by hundreds of local residents who then decide your practice is not for them.

MINIMIZING GENERATIONAL TENSION

A number of tactics can be used to help minimize and mediate generational tension in the practice.

MEREDITH ROGERS, MS, CMPP

Meredith Rogers, Generation X, has a bachelor of science degree in animal health from the University of Connecticut and a master of science degree in microbiology and molecular genetics from Rutgers University. She has more than 19 years of experience creating content for a variety of healthcare audiences. She lives in Kingston, New Jersey, and shares her life with a horse, a dog, and a cat.
Realize that every generation has something to teach the others.
Older generations often have a wealth of experience that only comes from time on the job, and younger generations tend to be technology savvy. Put those skills to use for the benefit of the entire practice. For example, a Baby Boomer could deliver a lunch-and-learn to the rest of the team on a difficult technique that he has mastered over time. Younger generations can help the practice boost marketing efforts through social media.

Find and cultivate commonalities.
For example, both Generation X and Millennials value a good work-life balance, which may help with structuring work shifts, especially if one person prefers working mornings and someone else loves dealing with those after-hours emergencies.

Capitalize on generational differences.
If a Baby Boomer employee becomes frustrated by a younger employee’s lack of expertise in a certain technique, turn the Baby Boomer into a mentor. Not only will this help the Baby Boomer feel important, it will allow the Millennial to feel like you are committed to her growth. If a Generation X employee is perceived as disengaged, give her a challenging assignment that reinvigorates her and fulfills her need to accomplish a meaningful task.

Promote discussion among staff about each generation’s perceptions, so that everyone can be better understood and conflicts can be resolved more easily. Team members who understand generational differences can adapt their interactions to better suit their coworkers’ needs.

GENERATIONAL PERSPECTIVES AMONG CLIENTS AFFECT YOUR PRACTICE, TOO
Much has been written about generational differences among coworkers, but what about your clients? The fact is that generational perspectives can have a great impact on how clients view your practice.

Marketing and Client Communications
If you want them to hear you, the method you use to communicate with your clients may be just as important as what you say to them. For example, a Generation X client may prefer to receive updates about his pet via email, but a Baby Boomer may be offended if she doesn’t receive a phone call from the practice.

Marketing your practice to the community should also take generational differences into consideration, keeping in mind that Millennials are the largest living generation today and are entering their prime earning and spending years. When advertising to Baby Boomers, the history of your practice and the extent of your education are seen as signs of credibility, whereas a Millennial may not even be aware that your hospital is just down the street unless you have a social media presence.

The workforce is changing, but all it takes is a little understanding for everyone to just get along.

In the Practice
When engaging with clients in person, adjust your communication style to what would be most acceptable to them. A Baby Boomer client may have experienced the same medical emergency with a previous pet and may be perfectly comfortable handling extra home care (eg, giving subcutaneous fluids), but you may need to admit the pet of a Millennial who is unsure about giving injections. Perhaps instead of calling at the end of the day to give an update to a Generation X client whose pet is at the hospital, send a photo and a note via text. Because phone calls take considerable time, this may free you up for other things that can generate income, such as handling another appointment.

CONCLUSION
All team members want basically the same things—to do their job well, to be understood, and to be valued. Providing the best care for the pets in your charge is what drives everyone to come to work every day. The workforce is changing and the world is changing, but all it takes is a little understanding for everyone to just get along.

References available at AmericanVeterinarian.com.

Table. GENERATIONAL DEFINITIONS AND WORKPLACE CHARACTERISTICS

<table>
<thead>
<tr>
<th>NAME</th>
<th>BIRTH YEARS</th>
<th>AGE</th>
<th>PERCENT OF WORKFORCE</th>
<th>CHARACTERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silent Generation</td>
<td>1928–1945</td>
<td>72–89</td>
<td>2%</td>
<td>Pros: values authority, hard work, loyalty, logic  Cons: averse to change Measures accomplishment by quality of work performed</td>
</tr>
<tr>
<td>Baby Boomers</td>
<td>1946–1964</td>
<td>53–71</td>
<td>29%</td>
<td>Pros: values hierarchies, teamwork, face time  Cons: ambivalent toward technology Measures accomplishment by hours worked, title, and money achieved</td>
</tr>
<tr>
<td>Millennials</td>
<td>1981–1997</td>
<td>20–36</td>
<td>34%</td>
<td>Pros: values diversity, change, work–life balance; adept in technology use  Cons: focused on self-goals; not team players Measures accomplishment by contribution of tasks completed</td>
</tr>
</tbody>
</table>

Values do not total 100% due to rounding; data as of 2015.2
Ensuring that clients understand the importance of socialization—and how to do it right—is the key to raising a calm pet that is comfortable in multiple surroundings.

By Kenneth Martin, DVM, DACVB, and Debbie Martin, LVT, VTS (Behavior)

It is not uncommon for cats to run and hide when visitors enter the home or when they are exposed to a carrier for travel to the veterinary clinic. Thirty-eight percent of cat owners find it stressful to take their cat to the veterinarian, and 58% report that their cat hates going to the veterinary clinic.1 Cat owners often consider fear-related reactions associated with visitors, veterinary visits, husbandry care, and vehicular travel to be “normal” behaviors, but they don’t have to be.

Keeping cats calm and comfortable begins with early exposure and positive socialization. With proper socialization, cats are more amenable to receiving veterinary and home health care because they are more tolerant of handling.

WHAT IS SOCIALIZATION?
Socialization is the process of learning to communicate with and relate to humans, members of the same species, and other animals. A hallmark of this period is social play.

For cats, the socialization period occurs between 2 and 7 weeks of age but can extend up to 14 weeks. It begins with self-play and batting objects followed by social play among littermates by about 3 weeks.2 Social play increases from 4 to 11 weeks of age and peaks by 12 weeks. It begins to wane after 12 weeks, and object play predominates until about 4 months of age when it begins to decline gradually.2 Socialization includes localization, which is the process of learning to be attached to specific environments. Cats tend to be most comfortable with environments to which they were exposed at a young age. Both socialization and localization shape future behavioral responses and prepare cats for myriad social and environmental experiences later in life.

Socialization and localization should include pleasant exposure to various environments, sounds, people, animals, and novelty. Pleasure can be enhanced by using “kitten-approved” reinforcers, such as special treats, toys, and petting around the head.

Early studies evaluating the effect of kitten handling on subsequent behavior toward people3-5 showed that handling by multiple people for as few as 5 minutes a day can have lifelong benefits, especially if done prior to 7 weeks of age.3-5 Other studies have suggested that friendliness and boldness of temperament may have strong roots in genetics, specifically linked to the behavior of the tom.6 Kittens sired by a sociable tom are more likely to be sociable. Kitten socialization with people can be facilitated by the presence of the queen if she is sociable and calm. Kittens are observational learners and will take social cues from the queen. It is much more difficult to socialize a kitten to people and other animals without early positive experiences before 7 weeks of age. By 14 weeks, social play between kittens is more likely to result in fighting.

A cat that is obtained after the socialization period, with an unknown or suspected lack of early positive experiences, can be socialized, but the process is much more difficult and ultimately will take longer.
CLIENT EDUCATION IS CRUCIAL

It is important for clients to understand that socialization is not simply about exposure to varied situations and people. Rather, it is about making exposure fun and positive from the start.

The following recommendations can help clients make the socialization process more effective:

• **Take the kitten to socialization classes**, often called "kitten kindergarten." These group classes offer controlled exposure to new people, cats, and environmental stimuli (Figure 1).

• **Ensure gentle daily handling by multiple people.** Gentle massage while providing special treats will make the experience pleasant. Social experiences with people may include kitten parties or inviting friends to the home to play with the kitten. Catnip may be sprinkled on the floor to foster exploration. Synthetic feline pheromones may enhance socialization experiences and reduce fear in some individuals. Wand toys may be offered to engage the kitten in interactive play with visitors yet at a social distance from unfamiliar people. Visitors should avoid potentially threatening body language such as direct approach, direct eye contact, and excessive petting. The kitten should be allowed to make the first move. "Playing hard to get" and ignoring the kitten initially may spur its curiosity.

• **Introduce kittens to travel carriers at an early age.** The carrier should be left out in the environment for exploration, with comfortable bedding, special treats, and toys be placed inside to entice entry. Special meals fed in the carrier make for continued pleasant experiences and positive reinforcement are the keys. By providing a sense of security, the carrier and the bedding inside should not slide. Generally, the safest place for the carrier is behind the front passenger seat. Short trips around the neighborhood may be paired with special meals fed in the carrier. Likewise, regular fun visits to the veterinary clinic, including delectable treats from veterinary staff members and exploration of examination rooms without the need for physical or medical care, can allow for pleasant associations.

• **Expose kittens to vehicular travel at an early age,** once acclimated to the carrier. Be sure the kitten has good footing to add a sense of security. The carrier and the bedding inside should not slide. Generally, the safest place for the carrier is behind the front passenger seat. Short trips around the neighborhood may be paired with special meals fed in the carrier. Likewise, regular fun visits to the veterinary clinic, including delectable treats from veterinary staff members and exploration of examination rooms without the need for physical or medical care, can allow for pleasant associations.

SUMMARY

Proper socialization of kittens involves planning and preparation. Group kitten socialization classes and kitten parties can make cats more adaptable to handling and being transported to new environments. Remember that socialization and exposure are only valuable if they are enjoyable for the kitten.

Advising your clients to take a positive proactive approach from the start will prevent the need for “rehabilitation” later, and foster a better relationship.

References available at AmericanVeterinarian.com.

IMPLEMENTING POSITIVE PROACTIVE EXPOSURE

Offer these tips to help clients ensure that the exposure experience is a positive one for their kitten:

• Prior to exposure, acclimate the kitten to a harness and leash or carrier for unsecure environments.

• Determine the kitten’s preferred reinforcers.

• Bring a hungry pet with a variety of pea-sized, “kitten-approved” treats. Include a water bowl and litter box for longer trips.

• Assume the kitten may be afraid. Offer treats in the carrier and vehicle for a positive association. For exposure to new people, objects, or environments, use treats liberally. Interactive play with wand toys may instill pleasant associations.

• Control the environment and what the kitten learns; keep experiences positive.

• Be aware of body language, and recognize signs of fear, anxiety, or stress. Be your kitten’s advocate. Do not wait for signs of fear before initiating food rewards.

• Keep sessions short and positive at first to avoid overwhelming the cat.

• Measure out the amount of treats the kitten will be fed, and end the session before running out of treats.

• Have fun!
When Should Mitral Valve Disease in Dogs Be Treated?

Results of a new study suggest that changes to current treatment recommendations for some dogs with mitral valve disease may be in order.

By Anthony P. Carr, Dr.med.vet., DACVIM

(continued from front cover)

It should be noted that the patient workup in most cases was insufficient to truly differentiate between dilated cardiomyopathy and endocardiosis. The study was very robust, however, with nearly 112,000 dogs included. Not surprisingly, the mean age at initial diagnosis was almost 10 years.

In another study using similar data, researchers found that certain purebred dogs were at greater risk for mitral valve disease compared with mixed-breed dogs. At-risk breeds included the cavalier King Charles spaniel, Chihuahua, whippet, poodle, shih tzu, Yorkshire terrier, and border collie, all of which are prone to mitral valve endocardiosis.

DIAGNOSTICS AND STAGING

Once a murmur has been detected, determination of staging and selection of treatment are the next steps. The American College of Veterinary Internal Medicine consensus statement on this topic from 2009 is very helpful and includes a recommended staging system (Table).

Certain diagnostics are clearly indicated once a murmur has been detected, regardless of whether overt signs of cardiac disease are present. Because murmurs typically occur in older patients, routine lab work is indicated. Blood pressure measurement is also recommended because hypertension will negatively affect the diseased heart (the heart must generate much higher pressures in hypertensive patients).

Most importantly, imaging is clearly indicated in these patients. Radiography is the first-line imaging choice; echocardiography is useful for patients in which radiographs are not diagnostic or to rule out dilated cardiomyopathy in larger dogs. Radiology will help determine whether the signs are respiratory or cardiac in origin and if heart failure is present (FIGURE 1). Imaging is also the basis for differentiation between stage B1 and B2 murmurs.

For radiographs to be diagnostic, they must be of optimal quality. Patients must be positioned properly and fully inspiratory when the radiographs are obtained. Poor positioning and expiratory radiographs can easily lead to a misdiagnosis of cardiomegaly or even heart failure.

TREATMENT CONSIDERATIONS

Whether to treat patients with stage B mitral valve disease (ie, dogs with endocardiosis and a murmur but no clinical signs of cardiac disease) is debatable. To date, there has been...
little indication that treatment prior to the development of clinical signs (e.g., cough, exercise intolerance, weakness, dyspnea) is of benefit.

A large placebo-controlled trial that included 229 cavalier King Charles spaniels with a murmur (including both B1 and B2 murmurs) found no improvement in survival or time to onset of heart failure when enalapril was given.\(^5\) Another trial using enalapril in patients with stage B2 murmurs showed a modest benefit at best, but only because all-cause mortality was improved.\(^6\) These results indicate that the benefits of enalapril may not have just been related to cardiac benefits in this study. Based on these results, however, treatment of dogs with stage B1 and B2 murmurs generally was not recommended—although, obviously, the bigger the heart is, the sooner heart failure will occur. Independent of these results, starting an angiotensin-converting enzyme inhibitor was not uncommon, although the benefits, if any, were likely not spectacular in dogs with stage B1 or B2 disease.

Although previous results were not encouraging, recent research has shown that treatment with pimobendan in stage B2 patients can result in a quite marked improvement in survival and can delay the onset of congestive heart failure.\(^7\) The randomized, blinded, placebo-controlled, prospective, multicenter EPIC trial (Evaluation of Pimobendan In dogs with Cardiomegaly caused by preclinical mitral valve disease) involved 360 dogs. All the dogs had mitral valve disease and left atrial enlargement (on echocardiogram, a left atrium:aorta ratio of >1.7, where normal is closer to 1).

With pimobendan treatment, the median time to reach the primary study endpoint (ie, onset of congestive heart failure or cardiac-related death) was 1228 days; with placebo the time was 766 days. This means that the dogs treated with pimobendan had 15 more months of symptom-free life than did the dogs treated with placebo. All-cause mortality was improved with pimobendan, most likely by reducing deaths from heart disease. All-cause mortality is an important marker to consider to verify that the medication does not have an adverse effect unrelated to the primary endpoint.

CONCLUSION

The results of the EPIC trial have significantly changed recommendations for the treatment of asymptomatic dogs with mitral valve disease. Because there is a significant improvement in quality of life and an overall improvement in life expectancy, early intervention is now clearly indicated. This means that proactive screening programs are in the best interest of these dogs. Initially, this can consist of as little as a good physical examination with thorough auscultation. Once a murmur has been detected, additional diagnostics will be needed and the frequency of rechecks will likely increase. For affected dogs, the EPIC trial results are very good news.

Table. ACVIM Staging of Mitral Valve Disease\(^4\)

<table>
<thead>
<tr>
<th>STAGE</th>
<th>DESCRIPTION</th>
<th>TREATMENT RECOMMENDED?(^\text{a})</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Dogs that are highly prone to cardiac disease but have no evidence of it; includes at-risk breeds in which a murmur has not been heard</td>
<td>No, but these patients should be screened more frequently for the onset of cardiac disease</td>
</tr>
<tr>
<td>B</td>
<td>Dogs with evidence of cardiac disease (usually a murmur is present but the dog is asymptomatic for heart disease)</td>
<td>Same as above</td>
</tr>
<tr>
<td>B1</td>
<td>Imaging results normal</td>
<td>Same as above</td>
</tr>
<tr>
<td>B2</td>
<td>Radiography or echocardiography indicates structural changes</td>
<td>Same as above(^b)</td>
</tr>
<tr>
<td>C</td>
<td>Dogs that have had or currently have heart failure</td>
<td>Yes</td>
</tr>
<tr>
<td>D</td>
<td>Dogs with congestive heart failure that is resistant to standard therapy</td>
<td>Yes</td>
</tr>
</tbody>
</table>

\(^{a}\) See Atkins et al.,\(^4\) for specific treatment guidelines for each stage of disease.

\(^{b}\) Results from the EPIC trial (see discussion above) show that treatment with pimobendan in stage B2 patients may have beneficial effects.
**Clinical Focus**

**BEHAVIOR**

**Feline Facial Pheromone Spray Reduces Stress in Cats During Veterinary Office Visits**

Feline veterinary visits cause significant stress for cats, owners, and staff alike. A new study shows that feline facial pheromone spray may bring more cats to the clinic without all the drama.

*By Karen Todd-Jenkins, VMD*

A recent study in the *Journal of Feline Medicine and Surgery* demonstrated reduced stress among cats exposed to feline facial pheromone spray during veterinary office visits.

Feline facial pheromone spray has been used to help manage urine marking, certain types of aggression, and other stress-associated behaviors in cats. The goal of this randomized, double-blinded, placebo-controlled study was to determine whether applying feline facial pheromone spray (Feliway, Ceva Animal Health) to the exam room table would affect the stress level and behavior of feline patients and ease handling during veterinary office visits.

**STUDY DESIGN**

The practice that participated in the study designated two exam rooms to be used. Investigators assigned the exam table in room “A” to be sprayed with a solution marked “B” (containing the placebo solution), and the exam table in room “B” to be sprayed with a solution marked “L” (containing the pheromone spray). Pet owners, clinicians, and observers were all blinded to the type of solution that was sprayed in each room. The sprays were applied directly to the exam table 15 minutes before each appointment to allow time for the alcohol base of each solution to evaporate.

To begin the study, the lead observer used a 15-day period to become familiar with the stress and behavior assessment tools that would be used in the trial. No results were recorded during that time. That period was followed by another 15-day period during which no spray solutions were used on any exam room tables, but the behavior of cats examined in both exam rooms was recorded. Cats examined during this time constituted the first control group.

Subsequently, for 30 days, investigators randomized cats to exam room A or B, and the previously marked spray was used on the tables before each exam. Between appointments, each table was cleaned with standard disinfectant, the floor was mopped, and the door was left open to air out the room in an effort to reduce residual odors.

The first 30-day active portion of the study was followed by a 7-day washout period during which no sprays were used on either table, and no observations were recorded for any feline patients. This period was followed by a 15-day phase during which no spray solution was used before exams. Cats examined during this period were evaluated and results recorded, serving as an additional negative control group. For the final 30 days of the study, the spray solutions used initially were reversed, such that spray “L” was used in exam room A and spray “B” was used in exam room B.

Eighty-seven cats were randomly allocated to room A or B. Investigators reported no significant differences between groups in terms of age, gender, breed, spay/neuter status, or indoor/outdoor status. Cats younger than 26 weeks of age were excluded to help eliminate kitten behavioral reactions, and all cats must have undergone at least one prior veterinary visit to allow for comparison with earlier behavioral observations by the owner. Cats currently or previously diagnosed with an illness that could cause pain or alter behavior were also excluded, as were cats receiving any medications. Similarly, because the stress of waiting in the reception area can alter behavior, any patients that waited 25 minutes or more to be seen were excluded.

Three parameters were assessed: stress level, ease of handling, and owner’s perception of how the cat behaved during the current visit compared with prior visits. The lead observer assessed each cat’s stress level before handling using a cat stress scoring scale. A separate scale was used to assess ease of handling during the appointment, and at the end of the appointment owners were asked to compare their cat’s behavior with what they could recall from prior veterinary visits using the following descriptions: (1) no difference/same as usual, (2) easier to handle/more relaxed, (3) more difficult to handle/more agitated, (4) more difficult to handle/more aggressive. Of the 87 cats included in the trial, 33% were exposed to facial pheromone spray, 38% to placebo spray, and 29% to no spray at all.

**RESULTS**

Results showed that the pheromone spray significantly reduced stress, as these cats received lower stress scores compared with cats in the placebo group. Forty-one percent of owners in the pheromone group reported that their cats seemed more relaxed and easier to handle, compared with 3% of owners in the placebo group. There was no significant difference between groups when ease of handling was assessed. The authors note that the optimal duration of exposure for feline facial pheromone spray to exert its effect has not been definitively determined in the medical literature. In this study, investigators waited 15 minutes after starting the appointment to complete their observations about the patient’s ease of handling, based on the cat’s behavior and perceived stress level at the time. The authors noted that “the 15-minute interval was enough to produce changes in the behavior of cats … as well as leading to real differences between both groups regarding stress scoring.”

**CONCLUSION**

The authors reported that, “This study supports the effectiveness of Feliway spray in reducing the stress of cats during consultations, helping them to cope better with the veterinary examination, from a feline welfare perspective.”

—Karen Todd-Jenkins, VMD

Dr. Todd-Jenkins received her VMD degree from the University of Pennsylvania School of Veterinary Medicine. She is a medical writer and has remained in clinical practice for over 20 years. She is a member of the American Medical Writers Association and One Health Initiative.

*Ceva Sante Animale (Libourne, France) advised the authors regarding study design and contributed to authorship of the paper, but the study received no grant from any funding agency in the public, commercial, or not-for-profit sectors.*
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Parasite Prevention and Resistance to Dewormers in Horses

Determining and applying appropriate farmwide deworming strategies can help minimize internal parasites and the growing resistance to dewormers in horses.

By Amy Bentz, VMD, DACVIM

Due to advances in equine management and nutrition, many horses today are living 30 years or longer. Preventive health care is a vital component of this longevity, including routine vaccination, deworming to minimize the parasite load, and proper farm management. Horses have different requirements at different ages, from the neonatal foal to the geriatric horse, and understanding these requirements will aid in implementing strategies to deliver optimal care as they grow and mature. This article focuses on deworming strategies to minimize internal parasites and the growing resistance to dewormers in horses.

Internal parasitism in horses can cause significant problems, such as poor growth, lethargy, poor body condition, diarrhea, colic, and even death. Certain equine populations are more susceptible to internal parasites, and deworming juvenile horses is necessary for their development. Young horses have high energy demands to fuel their rapid growth, and any imbalance—including carrying an internal parasite burden—will affect their overall health and can cause serious problems such as failure to thrive, unthrifty appearance, and colic. Older adult horses may have decreased immune function from diseases such as pituitary pars intermedia dysfunction, also known as equine Cushing’s disease. These horses are at higher risk for carrying a large parasite burden, which will affect their health, and should be monitored closely and dewormed periodically.

Ideally, an annual physical examination is performed by an equine veterinarian to evaluate the horse for changes and correct any deficits as quickly as possible. For example, if a horse has unexpectedly lost weight, diagnostic tests including a fecal egg count (FEC) can be conducted to determine whether internal parasites are the cause. FECs quantitatively measure the number of strongyle eggs in the horse’s manure and can be used to determine if and when a horse should be dewormed.

COMMON ANTHELMINTICS

The primary equine internal parasites of concern include Strongylus vulgaris and other large strongyles, cyathostominis (small strongyles), Parascaris equorum, Anoplocephala perfoliata, Oxyuris equi (pinworms), and bots (Gasterophilus spp.). Three main classes of anthelmintics (dewormers) are used in horses:

- Benzimidazoles (eg, fenbendazole, oxybendazole)
- Macrocyclic lactones (eg, ivermectin, moxidectin)
- Tetrahydropyrimidines (eg, pyrantel)

Also used are isoquinoline-pyrazine combinations, which are composed of praziquantel combined with another anthelmintic. In the United States, resistance has recently been reported to each of the main classes of anthelmintics used against equine parasites. Two common parasites with reported resistance are cyathostominis (small strongyles) and P. equorum.

GENERAL DEWORMING CONSIDERATIONS

Because every horse has unique needs and every farm has a different environment and management protocol, it is important for all horse owners to work with their veterinarian to create an individual parasite control...
deworming program each year. Requirements also vary throughout the country due to climate and seasonal variations that affect the optimal time of year to deworm horses. Remember that younger (i.e., <3 years old) and older (i.e., >20 years) horses may need additional deworming because their immune system may not be optimal, leading to a high parasite burden.

Although many mature adult horses have a competent immune system that will combat internal parasitism, they still need periodic deworming treatments and FECs to assess their parasite load in order to maintain optimal health. Limiting factors of the FEC include encysted cyathostomin larvae, which cannot be diagnosed using FECs, and tapeworm infections, which may go undetected due to intermittent egg shedding. Recognizing that it is not possible to eliminate all equine internal parasites, the goal is nevertheless to maintain the horse’s health and keep internal parasites at a minimum in order to prevent clinical disease. However, attempting to eradicate all internal parasites in horses will escalate parasite resistance.

FARMWIDE DEWORMING STRATEGIES
While deworming adult horses regularly is important, coordinated strategic deworming on a farm is more effective and can aid in minimizing parasite resistance to dewormers. In a typical equine population, approximately 20% of adult horses shed 80% of the strongyle eggs. Therefore, the goal for a strategic deworming program is twofold:
• First, use FECs to determine which horses on the farm are “high contaminators”; these animals shed the most parasite eggs, contaminating the farm.
• Second, deworm these horses more frequently with a targeted deworming method; deworm the “low contaminators” on the farm as needed.

This approach also includes administering anthelmintics at the proper time of year to decrease the parasite load of the horses on the farm, thereby minimizing parasitic contamination of the environment. Be sure to assess the horse’s weight before every anthelmintic administration, either by scale or weight tape, to ensure correct dosing; under-dosing the horse could lead to parasite resistance. An FEC reduction test may be used to determine if there is parasite resistance to a dewormer; however, samples from at least 6 horses from the herd should be used.

In addition to strategic deworming, pasture management is paramount to control parasites. Frequent (i.e., weekly) manure removal in the pasture is ideal to prevent contamination of the pasture by minimizing spread of parasitic eggs. Limit stocking density to an appropriate level of horses in a pasture based on size of the pasture, rainfall in the area, and the amount of available grass. Horses are herd animals and normally graze in a pasture for the majority of the day. They will overgraze in one area, leading to low grass, yet defecate in another area, causing high grass, and then will avoid grazing in that area. However, if there are too many horses in a pasture, they will graze in the manure-covered high grass area due to lack of pasture and thus become infected by parasite eggs.

The American Association of Equine Practitioners (AAEP) has created Parasite Control Guidelines that offer veterinarians and the public the latest information for deworming horses. These guidelines provide very useful information pertinent to developing an internal parasite control program for both individual horses and entire farms to avoid anthelmintic resistance. An exception to using this targeted method is deworming foals, weanlings, and yearlings; a different approach should be used for these animals due to their propensity to carry a large parasite burden. The AAEP Parasite Control Guidelines recommend deworming foals at least 4 times during their first year of life.

References available at AmericanVeterinarian.com.
Ethical quandaries in practice are best solved with a stepwise approach that considers all angles of the situation, all stakeholders, and all applicable laws.

By Veterinary Business Advisors, Inc.

We often hear stories in the news about ethical decisions, usually because someone’s ethics have been found wanting. Although some people either intentionally make unethical choices and/or don’t spend enough time determining the appropriate behaviors, even the most ethical people can sometimes struggle with deciding what actions are most appropriate when facing an ethical dilemma.

To add to the mix, few industries in the professional arena have as many ethical and legal obligations to as many parties as those in the veterinary field. Veterinary professionals must consider a number of factors when making decisions:

- Wishes of their clients
- Obligations to:
  - Animals
  - The public
  - Professional colleagues

Ethical practices are fairly easy to uphold in situations where everyone’s interests mesh. It’s when interests and obligations conflict that ethical dilemmas arise. Consider a scenario in which a client doesn’t authorize a treatment that you know is in the best interest of his or her pet. What do you do?

When a moral dilemma arises, it’s important to ensure that you are thoroughly familiar with the American Veterinary Medical Association (AVMA) Principles of Veterinary Medical Ethics and then apply those ethics to the situation at hand. Note that collective ethical rules have, at times, been given the force of law when adopted by veterinary medical boards.

You must also consider state laws. All 50 states have statutory framework focused on veterinary practices, creating licensing procedures, and establishing basic governance of veterinary medicine. State boards of examiners enforce and administer the laws under the state’s practice act and include these codes of professional conduct. State laws that are not specific to veterinary practice, such as malpractice laws, also need to be considered. Local laws must be recognized as well.

Although laws and professional codes are crucial to consider when making ethical decisions, these decisions often go beyond codification. They also include a person’s moral convictions, which aren’t—assuming laws and codes are met—enforceable from an outside body.

DECISION-MAKING ANALYSIS

Although no 2 ethical dilemmas are exactly the same, we recommend the following eight-step approach to solving
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ethical problems (Figure 1).
1. Clearly define the core ethical question, typically framed using what “should” or “ought” to be done.
2. Determine who is affected by this issue. Who are the major stakeholders? Minor ones?
3. Consider each of the major stakeholders. What are their primary interests and/or concerns?
4. Examine the facts in hand. What else do you need to know? How can you get this information?
5. Brainstorm! What are your goals? What potential solutions or alternative courses of action are available?
6. Now it’s time for moral discernment. Which moral values, principles, or rules are relevant? How would you prioritize them?
7. Go back to the brainstorming list and eliminate alternatives that aren’t feasible. How would you assess each of the solutions that remain when evaluated using the values you prioritized? Which solution is most acceptable when viewed through the lens of your priorities? Which one satisfies the greatest number of stakeholder interests? The solution that is doable, respects the broadest array of priority values, and satisfies the greatest number of major stakeholder interests is the most ethical choice.
8. Finally, it’s time for moral closure. Review your process. Have your goals been accomplished by your proposed solution? Are they compromised in any way? Have all parties’ views been represented, whether they were actively participating in the decision making or not? Can this alternative truly be implemented as proposed?

Here are two ethical dilemmas that any veterinary practice could face. Think about what you would do in each situation.

ETHICAL SCENARIO #1: CUSTODY DISPUTE
When a couple is divorcing, plenty of complicated issues can arise. These issues can affect your practice, especially if one spouse requests an irreversible procedure, such as euthanasia, spay/neuter, cosmetic surgery (ear cropping, tail docking, declaw), or relinquishing the pet for adoption, and the other spouse disagrees. Furthermore, courts are increasingly considering animals to be subject to custody laws, rather than as personal property, which makes this an even more pressing issue.

Consider this worst-case scenario. Longtime client Mrs. Jones is the documented owner of Oli, a 10-year-old male toy poodle. There is no mention of a Mr. Jones. One day, Mr. Jones brings Oli in for euthanasia because the dog is urinating on the carpet and barking too much. To complicate matters, a relief veterinarian is on duty; this veterinarian presents alternative options, but Mr. Jones cannot be swayed and he signs the consent form.

People in the practice know that this couple is in the middle of a heated divorce, but the relief veterinarian
does not, and he euthanizes Olli as requested. Mrs. Jones subsequently files a lawsuit against the practice, saying that Mr. Jones took this action to spite his wife.

Using the decision-making model described earlier, what alternate solutions would you have presented? What actions would have been reasonable from an ethics standpoint? What safeguard procedures would you implement?

ETHICAL SCENARIO #2: HUMAN MEDICINE

It isn’t unusual for a frightened cat to lash out and, even when safe handling procedures are followed, bite someone. How much treatment can a veterinary practice employee offer, given that veterinarians are not permitted to practice human medicine? Clearly, someone can assist the person with washing the wounds thoroughly and applying bandages because these are procedures that any “reasonably competent” individual can undertake are not considered medical practice. And, as many veterinary practices have staff members certified in standard first aid, this is clearly within scope.

But what about applying an antibiotic, such as cephalexin? It’s easy enough to apply and readily available, and it saves time for the person who was bitten. To balance clinic inventory, a prescription could be written for that person’s animal. If all heals well and no one says anything, these actions are unlikely to cause problems for anyone. Nevertheless, however well intended, multiple professional ethical tenets have been violated, including practicing medicine on a human and writing a false prescription.

Run this scenario through the decision-making analysis. What conclusions do you reach? Then throw in this added twist: What if the bite occurs during a raging blizzard and the wound looks fairly serious? Does this affect your decision?

CONCLUSION

Ethical quandaries are inevitable in veterinary practice. It’s how you handle them that matters. Taking into consideration the needs and desires of all stakeholders as well as all applicable laws, ensuring that every angle of the situation has been considered, and taking a stepwise approach to determine the appropriate actions to take will aid in making the most ethical decision.
Grow Your Practice Through Social Media

Social media is a great low-cost strategy to promote your practice and help it grow dramatically in a short amount of time.  

By Veterinarian's Money Digest™ Staff

Where do you see your veterinary practice at the end of 2017? Do you see it in exactly the same position it’s in today, or do you see a bigger, brighter, and better future?

If your answer is the latter, then one of your first tactics should be to focus on your practice’s social media presence. Social media is a great, low-cost way to promote your practice and see it grow dramatically in a short amount of time. In 2017 and going forward, the worst social media strategy will be avoiding social media altogether. How much harm can you possibly do by being active on Twitter, Facebook, LinkedIn, Instagram, and other social media sites? The answer may lie not in your expertise, but in your commitment and character.

Developing a social media strategy doesn’t have to be difficult. Even if you’re unfamiliar with the platform, you can craft a strategy that’s right for you. If you want to avoid being “bad” at social media, follow these great tips.

BE YOURSELF

Your veterinary practice is unique, as are the individuals who work there. This individuality doesn’t come across simply through your name, logo, or practice sign, but you can display your practice personality through social media. Social media platforms can easily tell the public who you are and why pet owners should visit your practice instead of your competitors’.

Create posts that illustrate the unique personality of your team. Have fun, but don’t try too hard—just be yourself and be as human as possible. Include willing clients and patients (with express permission only) in pictures or on your feeds.

INVOLVE THE WHOLE TEAM

Because social media is all about creating an experience for your clients, the more your staff is involved, the more the personality of your practice will shine through. Your clients want to know who they’ll be communicating with when they come to your practice, and telling them through social media is an easy way to make them feel comfortable.

Social media is particularly important for veterinarians looking to build not only their patient base but also their community ties.

GIVE IT TO THE EXPERT

You don’t have to be digitally savvy yourself to capitalize on social media opportunities. All you need is a budding Mark Zuckerberg on your team. You’re looking more for enthusiasm than expertise when it comes to this person. Someone who is familiar with these social media platforms and uses them personally is a plus! Just be sure you have strict guidelines in place that mirror the public image you want people to perceive through your social media accounts. It also wouldn’t hurt to review posts periodically before they go live if you can.

It’s time to get out there on social media in 2017! You may even find yourself further along next year than you could have imagined.
New Tool Lets Prospective Students Estimate the Cost of Veterinary Education

A handy web-based tool can help prospective students select the veterinary school that makes the most financial sense for them.

By Sarah Handzel, BSN, RN

It’s no secret that the cost of a veterinary education is substantial. Veterinarians already in practice know this, but what about someone who is thinking of becoming a veterinarian? If you know any such people, there is a new tool available that could help them estimate the cost of a veterinary education. Provided by the Association of American Veterinary Medical Colleges (AAVMC), the Web-based cost comparison tool allows prospective students to consider most options when choosing a college.

Prospective students today are increasingly concerned with the rising cost of higher education, especially if they have spoken with recent veterinary school graduates. Therefore, it is critically important for these prospects to take the time to consider the variety of costs associated with becoming a veterinarian in order to make a plan for dealing with them.

ACCESS TO VITAL DATA

The cost comparison tool allows users to view financial data from 30 veterinary colleges around the country. Information is provided on a state-by-state basis for resident and nonresident tuition costs, which can be adjusted for colleges where state residency is established after 1 year. Average annual increases in tuition are included, as is the amount of institutional scholarship aid awarded and the percentage of students who actually received financial assistance in the form of scholarships. Filters can be applied to narrow down college choices based on all these factors.

Prospective students can also look at the average amount of total loan debt that is accumulated by students enrolled in each veterinary program. However, the cost comparison tool does not factor in additional college financial obligations, such as the cost of living for the area around each school. Therefore, prospective students will have to thoroughly research each college location for more detailed information about the cost of living and expected personal expenses.

KNOWLEDGE IS POWER

“Educational debt is a complex problem, but we believe empowering people with information is a very promising strategy for improving this situation” said Andres T. McCabe, AAVMC chief executive officer, in a press release that accompanied the introduction of the cost comparison tool.

“We think providing clear, easy access to data regarding the various components of financing a professional education will help applicants make comparisons, analyze opportunities and ultimately make better financial decisions.”

Data for the cost comparison tool has been drawn from many sources, including the past 5 years of the Comparative Data Report, surveys of AAVMC member institutions, and internal calculations. Check it out at aavmc.org/Students-Applicants-and-Advisors/Funding-Education.aspx.

Educational debt is a complex problem, but knowledge is power.
FOR ORAL USE IN DOGS ONLY

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

Description:
SIMPARICA is a flavored, chewable tablet for administration to dogs over 6 months of age according to their weight. Each tablet is formulated to provide a minimum sarolaner dosage of 0.91 mg/lb (2 mg/kg) body weight.

Sarolaner is a member of the isoxazoline class of parasiticides and the chemical name is 1,3-(3R-(3S,5)-3,5-Dichloro-4-fluorophenyl)-5-(3(4-dihydroisoxazol-3-yl)-3'H-spiro(azetidine-3',1'-(2)benzofuran)-1-yl)-2-(methylsulfonyl)ethanone. SIMPARICA contains the S-enantiomer of sarolaner.

The chemical structure of the S-enantiomer of sarolaner is:

Indications:
SIMPARICA kills adult fleas, and is indicated for the treatment and prevention of flea infestations (Ctenocephalides felis), and the treatment and control of tick infestations (Amblyomma americanum [Lone Star tick], Amblyomma maculatum [Gulf Coast tick], Dermacentor variabilis [American dog tick], and Rhipicephalus sanguineus [brown dog tick]) for one month in dogs 6 months of age or older and weighing 2.8 pounds or more.

Dosage and Administration:
SIMPARICA is given orally once a month at the recommended minimum dosage of 0.91 mg/lb (2 mg/kg).

Dosage Schedule:

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>SAROLANER per Tablet (mg)</th>
<th>Number of Tablets Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.8 to 5.5 lbs</td>
<td>5</td>
<td>One</td>
</tr>
<tr>
<td>5.6 to 11.0 lbs</td>
<td>10</td>
<td>One</td>
</tr>
<tr>
<td>11.1 to 22.0 lbs</td>
<td>20</td>
<td>One</td>
</tr>
<tr>
<td>22.1 to 44.0 lbs</td>
<td>40</td>
<td>One</td>
</tr>
<tr>
<td>44.1 to 88.0 lbs</td>
<td>80</td>
<td>One</td>
</tr>
<tr>
<td>88.1 to 132.0 lbs</td>
<td>120</td>
<td>One</td>
</tr>
<tr>
<td>&gt;132.1 lbs</td>
<td>Administer the appropriate combination of tablets</td>
<td></td>
</tr>
</tbody>
</table>

SIMPARICA can be offered by hand, in the food, or administered like other tablet medications. 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 refused. If a dose is missed, administer SIMPARICA and resume a monthly dosing schedule.

SIMPARICA should be administered at monthly intervals. Failure to Treat and Prevention:

Treatment with SIMPARICA may begin at any time of the year. In areas where fleas are common year-round, monthly treatment with SIMPARICA can continue the entire year without interruption.

To minimize the likelihood of flea re-infestation, it is important to treat all dogs and cats within a household with an approved flea control product. Tick Treatment and Control:

Treatment with SIMPARICA can begin at any time of the year (see Effectiveness).

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

Warnings:
Not for use in humans. Keep this and all drugs out of reach of children and pets. For use in dogs only. Do not use SIMPARICA in cats.

SIMPARICA should not be used in dogs less than 6 months of age (see Animal Safety).

Precautions:
SIMPARICA may cause abnormal neurologic signs such as tremors, decreased conscious proprioception, ataxia, decreased or absent menace, and/or seizures (see Animal Safety). The safe use of SIMPARICA has not been evaluated in breeding, pregnant, or lactating cats.

Adverse Reactions:
SIMPARICA was administered in a well-controlled US field study, which included a total of 479 dogs (315 dogs treated with SIMPARICA and 164 dogs treated with active control once monthly for three treatments). Over the 90-day study period, all observations of potential adverse reactions were recorded.

Table 1. Dogs with adverse reactions

<table>
<thead>
<tr>
<th>Adverse reaction</th>
<th>sarolaner</th>
<th>sarolaner</th>
<th>active control</th>
<th>active control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>% (n=315)</td>
<td>N</td>
<td>% (n=164)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>3</td>
<td>0.95%</td>
<td>9</td>
<td>5.50%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>2</td>
<td>0.63%</td>
<td>2</td>
<td>1.20%</td>
</tr>
<tr>
<td>Lethargy</td>
<td>1</td>
<td>0.32%</td>
<td>2</td>
<td>1.20%</td>
</tr>
<tr>
<td>Inappetence</td>
<td>0</td>
<td>0%</td>
<td>3</td>
<td>1.80%</td>
</tr>
</tbody>
</table>

Additionally, one female dog aged 8.6 years exhibited lethargy, ataxia while posturing to eliminate, elevated third eyelids, and inappetence one day after receiving SIMPARICA concurrently with a heartworm preventative (ivermectin/pyrantel pamoate). The signs resolved one day later. After the day 14 visit, the owner elected to withdraw the dog from the study.

For a copy of the Safety Data Sheet (SDS) or to report adverse reactions call Zoetis Inc. at 1-888-963-8471. Additional information can be found at www.SIMPARICA.com. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or http://www.fda.gov/AnimalVeterinary/SafetyHealth.

Clinical Pharmacology:
Sarolaner is rapidly and well absorbed following oral administration of SIMPARICA. In a study of 12 Beagle dogs of the mean maximum plasma concentration (Cmax) was 1100 ng/mL and the mean time to maximum concentration (Tmax) occurred at 3 hours following a single oral dose of 2 mg/kg to fasted animals. The mean oral bioavailability was 86% and 107% in fasted and fed dogs, respectively. The mean oral T1/2 values for fasted and fed animals was 10 and 12 days respectively.

Sarolaner is distributed widely; the mean volume of distribution (Vdss) was 2.81 L/kg bodyweight following a 2 mg/kg intravenous dose of sarolaner. Sarolaner is highly bound (99.9%) to plasma proteins. The metabolism of sarolaner appears to be minimal in the dog. The primary route of sarolaner elimination from dogs is biliary excretion with elimination via the feces.

Following repeat administration of SIMPARICA once every 28 days for 10 doses to Beagle dogs at 1X, 3X, and 5X the maximum intended clinical dose of 4 mg/kg, steady-state plasma concentrations were reached after the 6th dose. Following treatment at 1X, 3X, and 5X the maximum intended clinical dose of 4 mg/kg, sarolaner systemic exposure was dose proportional over the range 1X to 5X.

Mode of Action:
The active substance of SIMPARICA, sarolaner, is an acaricide and insecticide belonging to the isoxazoline group. Sarolaner inhibits the function of the neurotransmitter gamma amino butyric acid (GABA) receptor and glutamate receptor, and works at the neuromuscular junction in insects. This results in uncontrollable neuromuscular activity leading to death in insects or aracnids.

Effectiveness:
In a well-controlled laboratory study, SIMPARICA began to kill fleas 3 hours after initial administration and reduced the number of live fleas by ≥96.2% within 8 hours after flea infestation through Day 35.

In a separate well-controlled laboratory study, SIMPARICA demonstrated 100% effectiveness against adult fleas within 24 hours following treatment and maintained 100% effectiveness against weekly re-infestations for 35 days.

In a study to explore flea egg production and viability, SIMPARICA killed fleas before they could lay eggs for 35 days. In a study to simulate a flea-infested home environment, with flea infestations established prior to the start of treatment and re-infestations on Days 7, 37 and 67, SIMPARICA administered monthly for three months demonstrated ≥96% effectiveness 48 hours post-re-infestation for 30 days.

In a well-controlled 90-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of SIMPARICA against fleas on Days 30, 60 and 90 visits compared to baseline was 99.4%, 99.8%, and 100%, respectively. Dogs with signs of flea allergy dermatitis showed improvement in erythema, papules, scaling, alopecia, dermatitis/psoriasis and pruritus as a direct result of eliminating fleas.

Animal Safety:
In a margin of safety study, SIMPARICA was administered orally to 8-week-old Beagle puppies at doses of 0, 1X, 3X, and 5X the maximum recommended dose (4 mg/kg) at 28-day intervals for 10 doses (8 dogs per group). The control group received placebo tablets. Neurologic signs were observed in the 1X group. In the 3X group, one male dog exhibited tremors and ataxia post-dose on Day 0; one female dog exhibited tremors on Days 1, 2, 3, and 5; and one female dog exhibited tremors on Day 1. In the 5X group, one female dog had a seizure on Day 61 (5 days after third dose); one female dog had tremors Days 1, 2, and 5; one female dog exhibited tremors on Day 140, and one female dog exhibited seizures associated with the second and fourth doses and tremors associated with the second and third doses. All dogs recovered without treatment. Except for the observation of abnormal head coordination in one dog in the 5X group two hours after dosing on Day 140 (dose 6). There were no treatment-related neurological signs observed once the dogs reached the age of 6 months.

In a separate exploratory pharmacokinetic study, one female dog dosed at 12 mg/kg (3X the maximum recommended dose) exhibited lethargy, anorexia, and multiple neurological signs including ataxia, tremors, disorientation, hypersalivation, diminished proprioception, and absent menace, approximately 2 days after a third monthly dose. The dog was not treated, and was ultimately euthanized. The first two doses resulted in plasma concentrations that were consistent with those of the other dogs in the treatment group. Starting at 7 hours after the third dose, there was a rapid 2.5 fold increase in plasma concentrations within 41 hours, resulting in a Cmax more than 7-fold higher than the mean Cmax at the maximum recommended use dose. No cause for the sudden increase in sarolaner plasma concentrations was identified.

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

How Supplied:
SIMPARICA (sarolaner) Chewables are available in six flavored tablet sizes: 5, 10, 20, 40, 80, and 120 mg. Each tablet size is available in color-coded packages of one, three, or six tablets. NADA #141-452, Approved by FDA

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Distributed by: Zoetis Inc.
Kalamazoo, MI 49007
Made in Switzerland
December 2015
30491300A&P
Flea and tick protection that goes on and on and on... all month long

Introducing Simparica

Monthly chewables for dogs that offer persistent protection from fleas and ticks.

Simparica acts fast—it starts killing fleas within 3 hours and ticks within 8 hours—and keeps going strong for 35 days without losing effectiveness at the end of the month.

IMPORTANT SAFETY INFORMATION: Simparica is for use only in dogs, 6 months of age and older. Simparica may cause abnormal neurologic signs such as tremors, decreased conscious proprioception, ataxia, decreased or absent menace, and/or seizures. Simparica has not been evaluated in dogs that are pregnant, breeding or lactating. Simparica has been safely used in dogs treated with commonly prescribed vaccines, parasiticides and other medications. The most frequently reported adverse reactions were vomiting and diarrhea. See full Prescribing Information on the back of this page and at www.zoetisUS.com/SimparicaPI.

Fetch more information about Simparica from Zoetis Customer Service at 1-888-ZOETIS-1 or 1-888-963-8471.