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Save Vets: Educate Owners

More than 1,700 horse owners responded to a survey conducted by Dr. Amy Grice through the Equine Network brands, which include English, Western and everything in between. The purpose of the survey was to determine veterinary care concerns during the pandemic in 2020-2021 and to see how those concerns changed in the first half of 2022.

The respondents' level of concern for the availability of veterinary care for their horses was broken down by zip code zones, then further broken down by the size and type of practice where their veterinarians worked. This will enable you to potentially compare your region to your own practice.



While the degree of concern for availability of veterinary care decreased in early 2022 compared to 2020-2021, there still were areas where more than 10% of respondents had high concerns in 2022. All zip code zones in 2022 had double-digit responses of moderate and minor concern.

There were also areas where owners had difficulty obtaining emergency service, with nearly 15% of respondents in the first half of this year saying they had "a lot" of difficulty.

The take-home message was that we all need to increase awareness about the current issues in the veterinary industry in order to ensure that all horses can receive the care they need now and into the future.

This Issue

Hang on for a little bit of horn-tooting: This is the largest *EquiManagement* print magazine that we have ever produced!

We greatly appreciate our sponsors and partners who support this print magazine and our digital efforts to educate equine veterinarians, vet students, vet techs and those involved in the equine veterinary industry.

We continue to delve into areas where the equine veterinary industry has the need for information, including business, veterinarian wellness and of course, equine research.

Our cover story, mentioned above, highlights our hard work and dedication to finding out what you need to know and bringing it to you.

Our veterinarian wellness coverage in this issue includes the articles "Plan Your Professional Future," "Creating a Position That Can Attract an Associate," "Ethical Practice Every Day," "Managing Cash Flow," "Veterinary Social Marketing" and "Battling Burnout."

On the equine health front, we have a focus on equine botulism in "Keeping Up," as well as "Cleaning Up 'Dirty' Mares," "The Madigan Foal Squeeze," "Severe Equine Asthma," "EVA and CEM," and "Forage-First Nutrition."

And don't miss our article on high-efficiency lighting for your equine clinic or hospital.

A big thanks to all who have helped the EquiManagement brand grow. As always, email me at kbrown@equinenetwork.com with any suggestions or concerns, and make sure to come see me at the 2022 AAEP Convention in San Antonio at Booth #14070! EM

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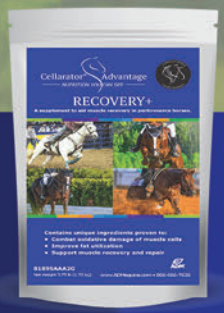
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ADM

By Nancy S. Loving, DVM

Botulism in Unexpected Places

(Editor's note: With drought and hay shortages in many parts of the country this year, we are focusing the majority of this Keeping Up section on a 'botulism basics' presentation.)

Some areas of the country, particularly east of the Mississippi River, are endemic for botulism. Equine practitioners in those areas are familiar with clinical signs and protective measures. Other parts of the United States rarely see cases of botulism.

With changing climatic conditions and poor hay yields in many regions this year, forage might be imported from one area to another, bringing with it the risk of contaminated feed leading to outbreaks of botulism.

A recent botulism outbreak in Florida has highlighted this disease as a concern among horse owners and veterinarians. Joe Lyman, DVM, MS, director of Professional Services and Product Development for Neogen Vet, presented a webinar discussing details that are important to horse owners and veterinarians throughout the United States.

As a neurologic disease, botulism is rapidly progressive and 90% fatal, especially if left untreated. Early on it is difficult to differentiate it from other neurologic diseases or even colic. Clinical signs are caused by toxins generated from *Clostridium botulinum* anaerobic bacteria, one of the most potent toxins on Earth. Lyman reported that one pint is able to kill all human life; just 1 gram (½ teaspoon) can kill 10,000 horses!

While there are eight different types of botulism toxin, Type B is responsible for at least 80% of equine cases and is most prevalent east of the Mississippi River. The western United States might also see cases of Type A that thrives in drier alkaline soil with little organic matter.

Botulism can develop with three different forms:

1. **Forage poisoning** is acquired by



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Toxicoinfectious botulism (shaker foal syndrome) occurs when foals ingest spores from the environment, especially through licking dirt.



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ingesting preformed toxin existing in a feed source from decaying grass, hay, grain, haylage, grass clippings or a decaying carcass. This is the most common form.

2. **Toxicoinfectious botulism (shaker foal syndrome)** occurs when foals ingest spores from the environment—especially through licking dirt—rather than from ingesting hay. Then conditions in the foal's gastrointestinal tract favor bacterial growth and release of toxin that is absorbed systemically. By several months of age, these GI conditions diminish. Most cases of Shaker Foal Syndrome (70%) occur between two to five weeks of age.

3. **Wound botulism** develops from soil contamination, especially of deep wounds with poor blood flow. These could be puncture wounds, injection site abscess and castration sites or umbilical infections.

Clinical Signs: The botulism toxin acts at the neuromuscular junction end plate by interrupting transmission of acetylcholine across the channels, leading to flaccid paralysis. Severity of disease is dependent on the dose of bacterial toxin involved.

Early on, the adult horse or foal displays decreased tongue, eyelid and tail tone. Clinical signs are symmetrical in severity and distribution, unlike asymmetrical signs seen with other neurologic diseases such as EPM.

With progression, botulism causes generalized weakness with non-specific signs such as a stilted or short-striding gait. Dysphagia is particularly symptomatic of botulism before other signs appear. Despite having a good appetite and wanting to eat, the horse is unable to coordinate muscle movements—feed drools from the mouth. While this might look like choke, feed and saliva dribble from the mouth and not the nostrils. A "grain test" (feeding grain by hand) is helpful to diagnose the difference.

Also, a botulism-affected horse is unable to control the rate of descent to the ground when trying to lie down, so he "plops" to the ground. Eventually, progressive paralysis keeps the horse recumbent; death usually occurs within 48-72 hours due to respiratory paralysis.

Shaker foal syndrome has similar signs, including muscle trembling or fasciculations. The foal is unable to nurse or swallow and might experience aspiration pneumonia.

Because botulism is not a central nervous system disease and only affects peripheral motor nerves, horses are completely aware of sensations of hunger, thirst, pain, fear or a full bladder. They are unable to move in response to their needs.

Diagnosis and Treatment: Often, diagnosis is presumptive based on clinical signs and history, as well as by ruling out other neurologic diseases. Most typical diagnostic tests such as PCR or antibody measurement take time, and these horses fail so quickly that it is impractical to wait for results. The faster the disease progresses, the worse the prognosis.

Treatment relies on aggressive strategies:

- Remove the likely source of toxin. Every minute contributes to paralysis that cannot be counteracted.
- Nasogastric intubation with mineral oil hastens GI transit time.
- Administration of antitoxin with hyperimmune plasma-trivalent antitoxin is best to address both Type A and B. Antitoxin binds to circulating toxin in blood but is unable to reverse damage to endplates. It takes seven to 10 days to regrow end plate tissue and without treatment, horses don't have that much time before they die.

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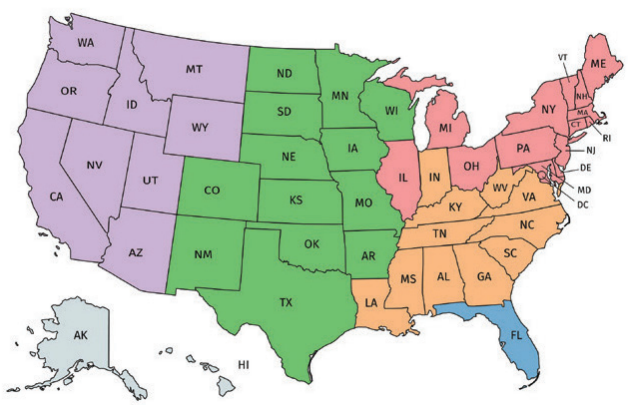
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DESCRIPTION: Domperidone is a D2 dopamine receptor antagonist. The chemical formula is 6-chloro-3-[1-[3-(2-oxo-3H-benzimidazol-1-yl) propyl]piperidin-4-yl]-1H-benzimidazol-2-one.

INDICATION: For prevention of fescue toxicosis in periparturient mares.

Contraindication: Horses with hypersensitivity to domperidone should not receive EQUIDONE Gel.

WARNINGS: Failure of passive transfer of immunoglobulins (IgG) may occur when using EQUIDONE Gel even in the absence of leakage of colostrum or milk. All foals born to mares treated with EQUIDONE Gel should be tested for serum IgG concentrations. Do not use in horses intended for human consumption.

HUMAN WARNINGS: Not for use in humans. For oral use in animals only. Keep this and all drugs out of the reach of children. Pregnant and lactating women should use caution when handling EQUIDONE Gel, as systemic exposure to domperidone may affect reproductive hormones. Domperidone is not approved for any indication in humans in the US. The safety of domperidone in lactating women and their nursing children has not been evaluated. Consult a physician in case of accidental human exposure.

PRECAUTIONS: EQUIDONE Gel may lead to premature birth, low birth weight foals or foal morbidity if administered >15 days prior to the expected foaling date. Accurate breeding date(s) and an expected foaling date are needed for the safe use of EQUIDONE Gel. The safety of EQUIDONE Gel has not been evaluated in breeding pregnant and lactating mares other than in the last 45 days of pregnancy and the first 15 days of lactation. The safety in stallions has not been evaluated. The long term effects on foals born to mares treated with EQUIDONE Gel have not been evaluated. Do not use in horses with suspected or confirmed gastrointestinal blockage, as domperidone is a prokinetic drug (it stimulates gut motility).

ADVERSE REACTIONS: The most common adverse reactions associated with treatment with EQUIDONE Gel are premature lactation (dripping of milk prior to foaling) and failure of passive transfer.

INFORMATION FOR HORSE OWNERS: Owners should be aware that treatment with EQUIDONE Gel may result in failure of passive transfer of immunoglobulins to the foal and that this may occur even when the mare does not drip milk. Owners should be advised that all foals born to mares treated with EQUIDONE Gel should be tested for serum immunoglobulin (IgG) concentrations. Owners should be informed that EQUIDONE Gel causes false positives on the milk calcium test used to predict foaling. Owners should be directed on the proper use of the multi-dose dosing syringe, including how to set the dial ring for accurate dosing after the first dose.

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- Medical treatment includes antibiotics and intravenous fluids because of risk of aspiration pneumonia.
- Oxygen therapy is needed in about half of cases, and 30% of horses might need ventilatory support.

Clinical signs can progress for another 12-24 hours following antitoxin administration. If the horse is not improving, another dose of antitoxin might be necessary. With timely intervention with antitoxin, 90% of horses recover. If horses are still standing at time of treatment, survival rate usually is high, but if the horse is already recumbent, then survival rate is around 18%. In general, 62% of cases experience complications.

Prevention: Prevention is everything with botulism. It is a "silent killer" that can be fatal without warning. Ensure a good feed source, particularly when feeding round bales. Store hay off the ground and in a dry area. Control rodents and discard decaying feed.

Keep in mind that forage travels across the country. That means veterinarians and horse owners need to be acutely aware of the potential for botulism during drought periods when local hay sources are scarce.

Vaccinate horses living in endemic areas with BotVax B toxoid, a risk-based vaccine that is USDA-approved for use in horses. Lyman recommended vaccinating any horse fed high-risk feed—compressed feed, round bales, on-ground feeding—or those living in high-risk conditions. He also advised vaccinating broodmares within 45 days of foaling to maximize colostral antibodies. Other horses to consider vaccinating include equine athletes and horses with sentimental value.

Botulism vaccine is boosted annually following the initial primary series of three doses administered monthly.

Hay Selection Research: Horse Versus Human

When looking for a source of hay, horse owners and veterinarians often evaluate quality through the senses, such as smell, feel and visible appearance of color. A Swiss study looked at how well human selection



GETTY IMAGES

Forage poisoning botulism can be caused by a decaying carcass in the hay. Forage poisoning is the most common type of botulism.

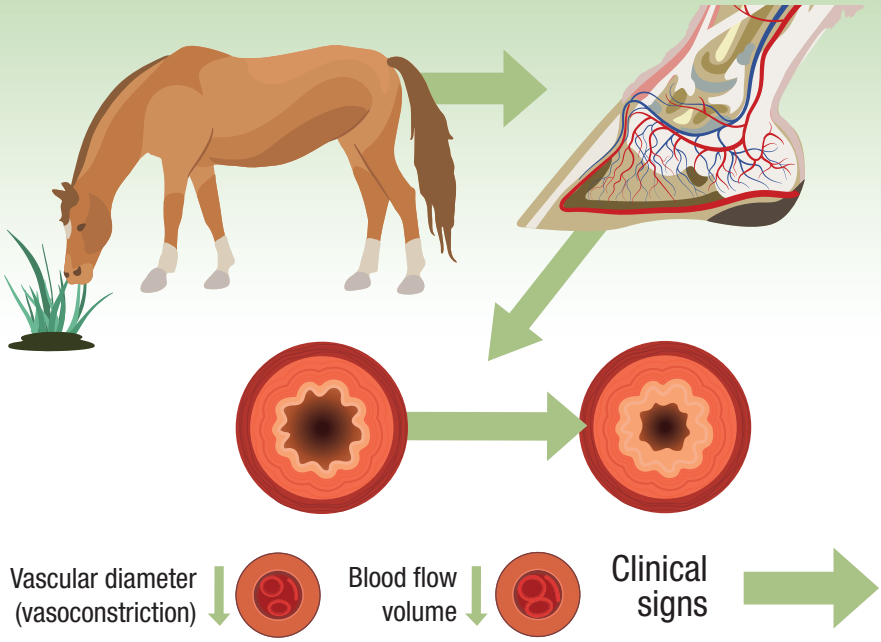
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Patent Pending #62/927,910

What horses are at risk of Laminitis?



Any horse with a history of laminitis should have insulin tested regularly. Horses that are “easy keepers” and over the age of 5 should also be monitored frequently, especially those genetically predisposed to metabolic disorders.



Horses being administered glucocorticoid steroid injections (triamcinolone, betamethasone, methylprednisolone), which can cause spikes in insulin, and horses undergoing long term treatment with steroids such as dexamethasone or prednisone.



Horses with free access to lush pastures and horses that consume large quantities of “sweet” feed or grain.



Horses used for breeding. Stallions can become foot sore and hesitant or unwilling to breed when experiencing mild laminitis. Insulin dysregulation has been proven to reduce fertility in mares and is a significant cause of unsuccessful breedings. Pregnancy, particularly late term, also predisposes mares to insulin dysregulation and laminitis.



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The Wellness Ready™ Insulin Test is a revolutionary new stall side blood test that allows you to instantly determine a horse’s risk for laminitis. This potentially life-saving tool helps veterinarians identify and manage horses prone to founder due to endocrine disorders such as Equine Metabolic Syndrome (EMS) and Equine Cushing’s Disease (PPID).

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A Swiss research project tested horse preference for hay versus human preference for what they thought their horses needed nutritionally.

stacks up against a horse's preference for palatability [Holzer, S.; Herholz, C.; Tanadini, L.G.; et al. Hay preferences in horses versus selection by their owners. *Livestock Science* (2022), doi: https://doi.org/10.1016/j.livsci.2022.1048].

Three different hays were offered to three groups of 12 horses each over a six-day period, with the final preference test on the sixth day. One group consisted of French mountain horse stallions; another group was made up of Icelandic horses (mostly geldings and two mares); the third group was comprised of warmblood horses (mostly geldings and three mares). The hay choices were different in texture, color, odor and nutrient content.

An initial preference was noted on Day 1, then Days 2-5 were adaption days, with Day 6 the final preference day. Three individual boxes containing 6.6 pounds of each hay were offered simultaneously for the final preference test, with the horses consuming around ¼-½ pound of hay over 30 minutes.

Type B hay was preferred by 69% of horses; type C preferred by 31%; and no horse selected type A hay. Crude protein content and leaves were moderately correlated with horse preference—their preferred selections were higher in quality, energy and protein than Type A hay and had more leaves and fewer stems.

Horse owners were able to assess two pounds of each hay via sight, touch and smell, and they made their choices based on which hay type they thought could provide optimal nutritional needs for their horses.

Interestingly, 42% of owners with easy keepers such as French mountain and warmblood horses preferred Type A hay to meet "nutritional requirements" because it seemed to have less energy and quality based on yellow color and higher fibrous content. Type A hay was the type that all the horses avoided.

Type B hay was green, soft and flexible, with a strong aromatic odor, and was the choice of hay for half of the Icelandic owners. Nearly half of Icelandic and warmblood owners selected Type C—fine stems, green, excellent aroma—compared to 25% of the stallion owners.

In summary, the horses preferred hay "with a leafy structure rich in energy and protein." All the horses avoided stemmy hay of a straw-like texture low in energy and protein.

"Among the owners, 42% preferred the hay type completely avoided by the horses, while approximately 30% chose one of the two other hay types rich in energy and protein as the best hay quality for their horses' assumed nutritional requirements." EM

By Amy L. Grice, VMD, MBA

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Planning Your Professional Future

According to research by Dr. Lisa Greenhill, senior director for Institutional Research and Diversity at the American Association of Veterinary Medical Colleges (AAVMC), 35.7% of applicants to veterinary schools reported that they want to work in equine medicine upon graduation. Her work also showed that over half of applicants made their decision about their desire for a career in veterinary medicine when they were 10 years old or younger.

Clearly the dream of being a horse doctor is common. While certainly all applicants are not admitted to veterinary school, many are. You might wonder what becomes of this high percentage of students wanting to be in the equine field upon graduation. Currently only about 2% of students enter equine private practice or an equine internship after graduating. Somewhere along the way these individuals give up their dreams.

Planning your professional future requires that you have a vision of what you want your life to look like in the years to come, both professionally and personally. A vision statement is a description of what an organization or person would like to achieve or accomplish in the future. It is intended to set a destination to serve as a clear beacon for plotting current and future paths of action. By articulating the long-term goal, you can understand what you are trying to achieve through your work. Working toward your dream can give meaning to hard work and sacrifice.

In order to grow the vision into reality, you should clearly write down action steps and a timeframe for achieving them in order to arrive at your destination. If your dream is to own your own sports medicine practice, maybe those steps include enrolling in business education and getting ISELP certification. As an associate in a first job, one could lay out a plan for learning these skillsets in a timely way while getting general practice experience.



GETTY IMAGES

For an older practitioner wanting to retire in a few years and worried about providing for their clients' future needs, that vision could include hiring a younger practitioner and mentoring that person to take over the practice.

Alternatively, the older practitioner could decide to merge with another local practice. Along the way, changes could be needed in how the practice operates, provides emergency services and handles financial policies in order to bring the practice into a more modern era. Having a timeline to accomplish these things while being a busy practitioner will help you to achieve those goals and arrive at your destination successfully.

Without a clear destination that you can picture, you might struggle to make the changes necessary to grow and improve. A vision helps immensely in the creation of a successful path to the desired end, whether the vision belongs to an organization or an individual.

When writing about your vision include the following:

- Project a specific time in the future, usually three to five years.
- Dream big, be brave and focus on success.
- Use the present or future tense.
- Use clear, concise language.
- Paint a colorful mental picture of the future you want.

Take-Home Message

When you have a clear picture of your destination, you can draw a road map to get there. Every decision can be made while considering your objectives for your future. Don't hesitate to live the life you have imagined. EM

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ARND BRONKHORST PHOTOGRAPHY

Many equine practitioners will be faced with diagnosing and treating severe equine asthma.

Managing Severe Equine Asthma

Managing horses with severe equine asthma can be challenging to equine veterinarians and their clients.

Brought to you by Boehringer Ingelheim

By Stacey Oke, DVM, MSc

With research showing that an estimated 14-20% of horses in the northern hemisphere suffer from severe equine asthma (SEA), this condition is one many practitioners will see. Veterinarians agree that unmanaged or recurrent severe equine asthma is both an economic and healthcare burden, leaving untreated horses with an extremely poor quality of life.

Considered under the umbrella term "equine asthma," severe equine asthma falls at the extreme end of the spectrum, with affected horses suffering cough, nasal discharge, nasal flaring, increased respiratory effort at rest and exercise intolerance. In chronic cases, a heaves line might be present.

If you read the textbooks and expertly authored articles such as the ACVIM Consensus Statement (available through open access at https://onlinelibrary.wiley.com/doi/full/10.1111/jvim.13824), guidelines for approaching severe equine asthma are clear: diagnostics first, to rule out other conditions that could mimic SEA, then targeted treatment for managing asthma with a concerted effort to minimize the use of medications. But as we know, the academic world is not always applicable to the real world.

The goal of this article is to relay to practicing veterinarians "in the trenches" what a textbook picture of diagnosing and managing severe equine asthma currently looks like. Challenges associated with achieving a textbook treatment are then addressed, followed by a look at how front-line practitioners can encourage clients to move in the direction of expert recommendations, overcoming barriers to successful management.

The Gold Standard Approach to SEA

"SEA is a non-septic inflammatory condition of the lower airways occurring in susceptible horses upon exposure to environmental allergens. SEA is characterized by bronchospasm, mucus accumulation in the airways and airway smooth-muscle remodeling, all of which

Aservo®
EquiHaler®
(ciclesonide inhalation spray)



Help them rise above severe equine asthma with ASERVO EQUIHALER.

The particles that can trigger severe equine asthma go deep into a horse's lungs, so it made sense to devise a way to get medication there, too. The new Aservo® EquiHaler® (ciclesonide inhalation spray) delivers a potent glucocortoid deep into the airway for targeted control of inflammation. And with its ergonomic design, it is easy to administer and easy for the horse to inhale. With treatment, horses with severe asthma can get back to breathing easy.

Breathe easy.



IMPORTANT SAFETY INFORMATION: ASERVO EQUIHALER has not been evaluated in pregnant or lactating mares. In a large clinical field study, the most common adverse reactions reported were coughing, nasal discharge, sneezing, and nasal irritation/bleeding. Glucocorticoids should be used with caution in horses at a higher risk for laminitis. Not for use in humans. Keep this and all medications out of the reach of children. In case of accidental inhalation, seek medical advice immediately.

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Approved by FDA under NADA# 141-533

Aservo® EquiHaler®

(ciclesonide inhalation spray) 343 mcg/actuation

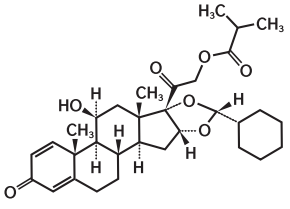
Glucocorticoid

For intranasal inhalation in horses only

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

Description:

ASERVO EQUIHALER (ciclesonide inhalation spray) is a non-pressurized metered dose inhaler and drug cartridge combination containing a solution of 30 mg/mL of the prodrug ciclesonide, which is enzymatically converted to the pharmacologically active metabolite desisobutyrylciclesonide (des-ciclesonide) following inhalation. Des-ciclesonide is a glucocorticoid class of corticosteroid. Each actuation releases 343 mcg of ciclesonide. Inactive carrier ingredients include alcohol, purified water, and hydrochloric acid. The structural formula for ciclesonide is:



Indication: ASERVO EQUIHALER is indicated for the management of clinical signs associated with severe equine asthma in horses.

Dosage and Administration: For intranasal inhalation use only. ASERVO EQUIHALER may be used as part of the overall management of severe equine asthma in addition to other appropriate strategies to control clinical signs, such as environmental changes and bronchodilator therapy, as needed.

The initial dose of ASERVO EQUIHALER is 8 actuations (2744 mcg ciclesonide) twice daily for 5 days, followed by 12 actuations (4116 mcg ciclesonide) once daily for 5 days.

Total treatment duration is 10 days	
Treatment days 1 to 5	8 actuations (puffs) Twice daily
Treatment days 6 to 10	12 actuations (puffs) Once daily

Prior to use, please refer to the detailed instructions for the handling and use of ASERVO EQUIHALER provided in this "User Manual".

ASERVO EQUIHALER should only be administered in the left nostril of the horse. Following careful and proper insertion, the ASERVO EQUIHALER should have a snug fit in the left nostril. A snug fit is required to ensure the horse receives a complete dose of ASERVO EQUIHALER.

Contraindications:

Do not use in horses with known hypersensitivity to ciclesonide or corticosteroids.

Warnings/Precautions:

Human Warnings: Not for use in humans. Keep this and all medications out of the reach of children. In case of accidental inhalation, seek medical advice immediately and show the package insert or the product label to the physician.

People with known hypersensitivity to ciclesonide or any of the excipients should avoid contact with ASERVO EQUIHALER.

Animal Safety Warnings and Precautions: Safe use of ASERVO EQUIHALER has not been evaluated in pregnant or lactating mares.

Clinical and experimental data have demonstrated that corticosteroids administered orally or by injection to animals may induce the first stage of parturition if used during the last trimester of pregnancy and may precipitate premature parturition followed by dystocia, fetal death, retained placenta, and metritis. Additionally, corticosteroids administered during pregnancy can be teratogenic. Therefore, ASERVO EQUIHALER should only be used in pregnant mares if the potential benefit justifies the potential risk to the fetus.

Administration of corticosteroids may worsen existing bacterial, fungal, or viral infection. Secondary infections should be ruled out before prescribing ASERVO EQUIHALER. Inhaled corticosteroids should be used with caution, if at all, in horses with active infection of the respiratory tract. If clinical signs do not improve or worsen despite administration of ASERVO EQUIHALER, the prescriber should consider additional diagnostic evaluation.

Due to the potential for exacerbation of clinical signs of laminitis, glucocorticoids should be used with caution in horses with a history of laminitis, or horses otherwise at a higher risk for laminitis.

Use with caution in horses with chronic nephritis, equine pituitary pars intermedia dysfunction (PPID), and congestive heart failure.

Concurrent use of other anti-inflammatory drugs, such as non-steroidal anti-inflammatory drugs (NSAIDs) or other corticosteroids, should be approached with caution. Due to the potential for systemic exposure, concomitant use of NSAIDs and corticosteroids may increase the risk of gastrointestinal, renal, and other toxicity. Consider appropriate wash out times prior to administering NSAIDs or additional corticosteroids.

Other Warnings: Do not use in horses intended for human consumption.

Adverse Reactions:

The clinical safety of ASERVO EQUIHALER was assessed in a vehicle-controlled, randomized, double-blind 10-day field study followed by a 90-day open-label, extended-use field safety phase. In this field study, 319 client- or university-owned horses received either ASERVO EQUIHALER or vehicle control (the identical device containing the vehicle with no ciclesonide) during Phase 1.

Following Phase 1, 108 horses were enrolled in Phase 2, during which they could receive treatment for up to an additional 3 months. All horses in Phase 2 received the ASERVO EQUIHALER. Three hundred nineteen horses (163 ciclesonide and 156 control) of various breeds, 6 to 34 years of age, and weighing approximately 450 to 1,850 pounds were included in the field-study safety analysis. Adverse reactions that were reported in Phase 1 are listed in Table 1, and adverse reactions that were reported in Phase 2 are listed in Table 2.

The most common adverse reaction reported was coughing either during or immediately following inhalation of the test article (both ASERVO EQUIHALER and vehicle control groups).

Leukocytosis and/or neutrophilia developed in Phase 1 in several horses in both treatment groups, and in eight horses in Phase 2. Some of these horses also had concurrent clinical signs of infection, such as fever, which may have contributed to the leukocytosis. One ASERVO EQUIHALER-treated horse developed fever and leukocytosis characterized by a mature neutrophilia on Day 10 that was not present at screening. Other horses had possible alternate explanations for a stress leukogram, such as pain from a hoof abscess or poor acceptance of the device which may have caused stress from the study procedures.

In Phase 1, three ASERVO EQUIHALER-treated horses had increases in serum sorbitol dehydrogenase (SDH) above the reference range on Day 10 (high values were 12.4, 18.1 and 30.4 U/L); their baseline values were within the reference range (2-6 U/L). None of these horses had clinical signs attributable to elevated SDH levels. One horse also had an increase in serum gammaglutamyltransferase (GGT compared to baseline, but the GGT value at baseline was already above the reference range. By Day 40 of Phase 2, and again when measured at Day 100, this horse's SDH and GGT values were within normal limits. In Phase 2, one horse developed an elevation in SDH (63.8 U/L) following the 6th course of ASERVO EQUIHALER treatment. This horse had elevations in alkaline phosphatase (269 U/L, reference range 76- 262 U/L), aspartate aminotransferase (511 U/L, reference range 194-431 U/L), and GGT(128 U/L, reference range 9-37 U/L).

Reported adverse events in this horse at various time points during the study included coughing, nasal discharge, tachycardia, and hyperthermia. After the visit at which abnormal blood work was detected, the owner opted to withdraw the horse from the study (approximately Day 75).

In Phase 1, one horse developed severe hives 30 minutes after the fourth dose of ASERVO EQUIHALER. This horse was removed from the study due to this adverse reaction.

*Horses may have had one or more reports of a given adverse reaction

Table 1: Number(%) of Horses with Adverse Reactions in Phase 1 of field study

Adverse Reaction	ASERVO EQUIHALER (N=163) n(%)	Vehicle Control (N=156) n(%)
Cough	27 (16.6)	27 (17.3)
Nasal Discharge	17 (10.4)	17 (10.9)
Leukocytosis and/or neutrophilia	10 (6.1)	7 (4.5)
Sneezing	5 (3.I)	3 (1.9)
Nasal irritation/ bleeding	2 (1.2)	3 (1.9)
Increase in serum Sorbitol Dehydrogenase (SDH)	3 (1.8)	0 (0)
Hives	1 (0.6)	0 (0)

Table 2: Number (%) of Horses with Adverse Reactions in Phase 2 of field study

Adverse Reaction	ASERVO EQUIHALER (N=100) n(%)
Cough	12 (12%)
Nasal Discharge	13 (13%)
Leukocytosis and/or neutrophilia	8 (8%)
Nasal irritation/bleeding	6 (6%)
Laminitis	3 (3%)
Sneezing	2 (2%)
Increase in serum Sorbitol Dehydrogenase (SDH)	1 (1%)

*Horses may have had one or more reports of a given adverse reaction

Laminitis was reported in three horses during Phase 2. Two of the horses were noted to have a history of or physical evidence of prior laminitic episodes. The third horse had no prior history of laminitis, was initially treated for thrush, and responded to conservative therapy within a few weeks.

No definitive diagnosis of laminitis was made, and the examining veterinarian concluded the horse's environment played a role in the development of clinical signs.

In Phase 1, in both treatment groups, nasal soreness, bleeding, scabs in the nostril, and redness of the nostril were reported in five horses.

In Phase 2, horses were reported to have epistaxis (2 horses), blood tinged discharge (1 horse), nose bloody and raw (1 horse), sensitive nostril (1 horse), and bright pink color of nasal mucus membranes (1 horse). One case of epistaxis was reported 9 days after the last dose administered, and one case was reported from the right nostril less than 24 hours following the last dose. The blood tinged discharge from the left nostril was reported 11 days following the last dose administered. In Tables 1 and 2, these similar clinical signs are summarized as nasal irritation/bleeding.

To report suspected adverse drug events and/or obtain a copy of the Safety Data Sheet (SDS) or for technical assistance, contact Boehringer Ingelheim Animal Health USA Inc. at 888-637-4251. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at www.fda.gov/reportanimalae

Information for Horse Owners:

Please review the User Manual with horse owners to ensure they understand the entire contents. The User Manual includes important instructions regarding the proper handling and use of ASERVO EQUIHALER. Demonstration of the activation, administration and storage of ASERVO EQUIHALER with the horse owner is highly recommended.

Clinical Pharmacology:

Pharmacokinetics: A four period pharmacokinetic study was conducted using 6 average weight horses and 6 light weight horses. Each horse received the following dosing regimens:

Period 1: 12 actuations (4116 mcg ciclesonide/horse) as a single inhalation administration,

Period 2: 16 actuations (5488 mcg ciclesonide/horse) as a single inhalation administration,

Period 3: 8 actuations (2744 mcg ciclesonide/horse) twice a day for 4 consecutive days and once on the fifth day,

Period 4: 8 actuations (2744 mcg ciclesonide/horse) twice a day for 5 consecutive days followed by 12 actuations (4116 mcg/horse) once a day for 5 days.

Blood samples were collected at pre-dose, 0 minutes, 5 minutes, 15 minutes, 30 minutes, and 1, 2, 4, 6, 8, 10, 12, and 24 hours after a single inhalation administration of 2744, 4116, and 5488 mcg in periods 1, 2, 3, and after multiple doses of 2744 and 4116 mcg in Periods 3 and 4.

Urine samples were collected at 24 and 48 hours in Period 4. Plasma and urine samples were analyzed for ciclesonide and des-ciclesonide concentrations using validated liquid chromatograph/mass spectrometry methods.

Ciclesonide was rapidly metabolized to des-ciclesonide; there were quantifiable concentrations of des-ciclesonide in most horses at 5 minutes post-dose. Urine concentrations of ciclesonide and des-ciclesonide were below the limit of quantification at 24 and 48 hours after inhalation administration of 2744 mcg twice a day for 5 days followed by 4116 mcg once a day for 5 days. Table 3 summarizes the results of the pharmacokinetic analysis for des-ciclesonide in average and light weight horses (adjusted for bodyweight) after inhalations of 2744 mcg ciclesonide twice a day for 5 days followed by inhalations of 4116 mcg ciclesonide once a day for 5 days.

Table 3: Mean (± standard deviation; SD) pharmacokinetic parameters of des-ciclesonide after inhalations of 2744 mcg ciclesonide twice a day for 5 days followed by inhalations of 4116 mcg ciclesonide once a day for 5 days

Parameter	Dose (mcg)	Average Horse	Light Horse
C_{max} (pg/mL)	2744	232.67 (40.89)	297.00 (92.0)
T_{max} (hrs)†	2744	0.50 (0.5-0.5)	0.50 (0.25-1.0)
AUClast (hr*pg/mL)	2744	824.26 (81.77)	1087.07 (137.85)
$t_{½}$ (hrs)	2744	5.00 (1.06)	5.94 (2.12)
C_{max} (pg/mL)	4116	297.50 (104.62)	493.00 (248.27)
T_{max} (hrs)†	4116	0.50 (0.5-1.0)	0.50 (0.5-1.0)
AUClast (hr*pg/mL)	4116	1011.39 (291.72)	1550.31 (690.02)
$t_{½}$ (hrs)	4116	6.08 (2.42)	9.75 (4.20)

C_{max} = maximum plasma concentration

† T_{max} = time to maximum concentration; median (range)

AUClast = area under the concentration vs time curve to the last quantifiable concentration

$t_{½}$ = half-life

The drug exposure of des-ciclesonide was higher and more variable in the light weight horses compared to the average weight horses.

For des-ciclesonide in both average and light weight horses, there was a greater than dose proportional increase in Cmax and AUClast with an increase in dose from 2744 to 4166 mcg, after a single dose.

There was minimal accumulation of des-ciclesonide after inhalations of 2744 mcg ciclesonide twice a day for 5 days followed by inhalations of 4116 mcg ciclesonide once a day for 5 days.

Mode of Action: The affinity of des-ciclesonide to human and rat lung glucocorticoid receptors is 120 times greater than the parent compound's affinity and 12 times greater than dexamethasone's affinity. Des-ciclesonide's anti-inflammatory properties are exerted via a wide range of inhibitory activities against cell types including mast cells, eosinophils, basophils, lymphocytes, macrophages, and neutrophils as well as against pro-inflammatory mediators such as histamine, eicosanoids, leukotrienes, and cytokines.

Effectiveness:

In a multi-center, vehicle-controlled, randomized, double-blind, field study, 320 horses were randomly allocated to receive either ASERVO EQUIHALER, the investigational veterinary product containing the active ingredient ciclesonide, or the control product, consisting of an identical inhaler device containing the vehicle with no ciclesonide. The study consisted of two phases, and 108 of the 320 enrolled horses participated in both Phase 1 and Phase 2 of the study.

Phase 1 of the study consisted of a double-blind, 10-day evaluation of the effectiveness and safety of ASERVO EQUIHALER compared to vehicle control for the management of clinical signs associated with severe equine asthma in both client- and university-owned horses under field conditions. Modifications of the horse's environment were not allowed during Phase 1. Following completion of Phase 1, 108 horses participated in the 90-day open-label Phase 2 to evaluate the safety of ASERVO EQUIHALER during repeated use.

In Phase 1, a weighted clinical score (WCS) was calculated to assess both eligibility at study enrollment and treatment success at the conclusion of the study.

The WCS was comprised of nine clinical parameters (respiratory rate, nasal discharge, nasal flaring, abdominal lift, tracheal sounds, bronchial tones, crackles, wheeze, and cough) with a maximum score of 23.

In order to enroll, horses were to have a WCS ≥ 11 (see Table 4), weigh at least 200 kg, have a diagnosis of severe equine asthma with observation of at least one clinical sign for 14 days or more prior to enrollment, have history of at least two previous episodes of labored breathing at rest, and have history of improvement with appropriate treatment (for example, glucocorticoid administration, bronchodilator administration, and/or change in environment). Two hundred fifty-eight horses (134 ASERVO EQUIHALER and 124 control) were included in the effectiveness analysis. Horses that were not fully dosed after enrollment due to the horse's refusal to accept the device were included in the analysis as treatment failures.

Table 4: Weighted Clinical Score

Parameter	Score: Description
Respiratory rate (breaths/minute)	0: <16 bpm 1: 16-20 bpm 2: 21-25 bpm 3: 26-30 bpm 4: >30 bpm
Nasal Discharge	0: None 1: Serous 2: Mucous 3: Mucopurulent
Nasal Flaring	0: None 1: Present
Abdominal Lift	0: None 1: Mild movement of abdomen and/or thorax and/or anus (with or without perceptible heaves line) 3: Pronounced movement of abdomen and/or thorax and/or anus (with or without perceptible heaves line)
Tracheal Sounds	0: Normal 1: Increase in intensity 3: Mucus Movement
Bronchial Tones	0: Normal 2: Audible ventral and/or dorsal sounds
Crackles	0: None 2: Present
Wheezes	0: None 2: Present
Cough	0: None 1: Inducible by moderate pressure signal on larynx (only to be checked in the absence of intermittent or paroxysmal cough) 2: Intermittent 3: Paroxysmal

A horse was considered a treatment success if there was a reduction in the WCS by at least 30% between Day 0/1 and Day 10, and had a Day 10 WCS ≤ 14. In this study, 52% of horses treated with ASERVO EQUIHALER vs. 33% of the horses treated with vehicle control had treatment success (p=0.0187), demonstrating the ASERVO EQUIHALER (ciclesonide inhalation spray) is effective for the management of clinical signs associated with severe equine asthma in horses.

Phase 2 provided field safety and use information for repeated 10-day courses of treatment under conditions of use, including use with other appropriate treatment strategies. During Phase 2, 88 horses completed the full 100-day study. The most common reason for early withdrawal was perceived lack of effectiveness (n=7). Horses were to be prescribed a 10-day course of the ASERVO EQUIHALER when the WCS was ≥ 9. Eight out of 108 did not receive additional inhaler devices. Of the 100 horses who qualified for retreatment, 52 (52%) qualified for one to three additional courses of treatment. Two horses that were in the ASERVO EQUIHALER group during Phase 1 received nine additional courses of treatment in Phase 2, resulting in 100 days of exposure to ASERVO EQUIHALER. Twenty-three (23%) horses received seven to nine courses of treatment during Phase 2. Concomitant medications and environmental changes intended for the overall management of severe equine asthma were allowed in Phase 2. The most commonly prescribed concomitant medications included bronchodilators and antihistamines. Systemic antimicrobials were prescribed in six horses where the clinical signs of severe equine asthma were not adequately controlled, clinical signs worsened despite continued administration of ASERVO EQUIHALER, or clinical signs of infection developed.

Two horses received dexamethasone at early study withdrawal because their disease was insufficiently controlled.

The most common environmental changes implemented during Phase 2 included soaking or steaming the hay, changing the forage source to either hay cubes or silage, changing the hay source (including stopping access to round bales), and increasing time out on pasture compared to time spent in the barn.

Animal Safety:

In a 1-month target animal safety study, 32 healthy adult horses (16 mares and 16 geldings) were assigned to 1 of 4 treatment groups, with 8 horses per group.

Each treatment group contained 6 average weight horses (371.9 to 539.8 kg; mean 477.0 kg) and 2 lightweight horses (121.5 to 260.5 kg; mean 179.5 kg). Light weight horses were specifically included to assess the safety of the highest mg ciclesonide/kg body weight dose.

Horses were randomized into four treatment groups, each receiving a different multiple of the therapeutic dose for 30 days (three times the treatment duration) administered with the nasal inhaler device. The treatment groups received OX (vehicle control), IX, 2X, and 3X the therapeutic dose of ciclesonide, respectively. Each treatment group included a total of 8 horses, six average weight horses (3 males and 3 females) and two light weight horses (1 male and 1 female). Horses in the control group received the same number of actuations as the highest dose group (3X) from the nasal inhaler device with vehicle only.

Mild mucoid to seromucoid nasal discharge was observed in all treatment groups, including controls, and did not appear to increase after treatment. In general, for the OX, 2X, and 3X groups, the number of different fungal species isolated from the nares increased by Day 30; however, the result may have been an effect of extended time in the barn with direct contact with other horses and the environment rather than related to treatment with the inhaler. One horse cultured *Candida* species post-treatment, and that horse had no abnormal clinical signs. The dosing was intended to mimic twice daily dosing for the first 15 days, and then the once daily dosing for the second half of the study.

Facial asymmetry or deviation of the muzzle was observed in two horses during the study in the ciclesonide-treated groups. The signs resolved in one horse prior to the study conclusion.

No other related abnormal signs were observed, and no pathologic findings were correlated with this abnormality.

Cortisol levels were measured as a marker for suppression of the hypothalamic-pituitary-adrenal axis by systemic action of corticosteroids. Two light weight horses in the 3X ciclesonide-treatment group had values (16.3 and 14.1 ng/mL) that were lower than any other values recorded in the study (including baseline values and values from control horses), and lower than the normal reference range (27.6-73.2 ng/mL) on Day 14 (the end of the twice daily treatment period).

At Day 29, one horse's cortisol value returned to within the reference range (55.9 ng/mL) and the other remained low (15.9 ng/mL). These reductions in cortisol values in the smallest horses in the highest dose group may represent cortisol suppression from corticosteroid administration; however, neither of these horses had adverse events attributable to administration of ciclesonide.

Sorbitol dehydrogenase (SDH) levels were not statistically significantly different between ciclesonide treatment groups and the control group. However, one control horse (Day 14, SDH 13.6 U/L), one light weight horse in the 2X treatment group (Day 29, SDH 9.3 U/L), and two light weight horses in the 3X treatment group (Day 29, SDH values of 10.4 and 8.8 U/L) had SDH values that were above the reference range (reference range 1-8 U/L). These values did not correspond with increases in other liver enzymes and the horses remained clinically normal.

Storage Information:

Store at 15-30°C (59°-86°F), with excursions permitted up to 40°C (104°F). Protect from freezing.

Use within 12 days of activation.

How Supplied:

ASERVO EQUIHALER is supplied as one inhaler with a pre-inserted cartridge consisting of a plastic container crimped in an aluminum cylinder which contains inhalation solution for 140 treatment actuations (puffs).

Marketed by:

Boehringer Ingelheim Animal Health USA Inc.
Duluth, GA 30096

Made in France

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ARND BRONKHORST PHOTOGRAPHY

Many horses with severe equine asthma also have comorbidities such as PPID, which calls for judicious use of corticosteroids.

are a consequence of inflammation," said Laurent Couëtil, DVM, DACVIM, associate professor of large animal medicine and director of the Equine Sports Medicine Center at Purdue University's College of Veterinary Medicine.

Diagnosis. In a world without financial, equipment/skill or geographic barriers (i.e., proximity of referral centers), Couetil said, "I think that the minimum database for an initial evaluation of a horse suspected of SEA is a detailed history such as risk factors like hay feeding, a thorough physical exam, hematology and inflammatory biomarkers (serum amyloid A or fibrinogen), as well as bronchoalveolar lavage (BAL) cytology." Only then, if findings are consistent with SEA, should the horse be treated and the horse's response to treatment evaluated.

"If there is no response to treatment, then a more in-depth workup is needed," advised Couëtil. "This advanced workup would include endoscopy and pulmonary function tests, either with or without thoracic radiography. I rarely do the latter but routinely do pulmonary function tests."

Treatment. The current agreed-upon goals of treatment are to decrease airway inflammation, relieve bronchospasm and reduce mucous secretion.

Environmental control of allergens. The main environmental sources of allergens are respirable dust particles in feed and bedding—such as mold spores, mites, endotoxins, antigenic materials and pollens. Of those, the number one cause of allergen exposure is hay dust and exposure from round bales.

Simões et al. (2020) therefore recommended the following for minimizing exposure of horses to common environmental allergens:

- Have at least two openings in a stall for fresh air circulation to address ventilation.
- Stable horses minimally.
- Ensure horses spend at least 12 hours per day outdoors.
- Remove horses from the stables while cleaning/mucking.
- Use dust-free wood shavings, cardboard or other low-dust options.
- Avoid dry hay and instead offer soaked hay or cubed/pelleted feeds.

When environmental control of allergens alone provides insufficient control of severe equine allergy, pharmacologic options should be considered. Owners need to appreciate that there is no cure for this condition, and it is recurrent in nature (hence its previous name, recurrent airway obstruction or RAO).

Corticosteroids. "If finances are a major limiting factor, I recommend systemic dexamethasone for three to five days. If the horse improves, then taper the dose down," recommended Couëtil. But, he said, it is paramount to first address the cause (i.e., exposure to allergen/dust).

"If not, the horse will be back to square one with one to two weeks of stopping medication," Couëtil warned.

He added, "Depending on the situation, I may recommend aerosol therapy with either ciclesonide or a nebulized corticosteroid. Specifically, my first choice for aerosol therapy would be ciclesonide. It is an all-in-one device (Aservo Equihaler) that would

Comorbidities to Consider

Some horses with severe equine asthma (SEA) also have comorbidities that are "working against them, such as pituitary pars intermedia dysfunction," said Jake Jensen, DVM, partner at Janssen Veterinary Clinic in Sheridan, Indiana. "These horses are prone to laminitis already, so steroids need to be used cautiously."

Kate Hodson, DVM, of Hodson Veterinary Services LLC in Hebron, Indiana, agreed, saying that a number of her severe equine asthma cases are also metabolic, including those with PPID or insulin dysregulation.

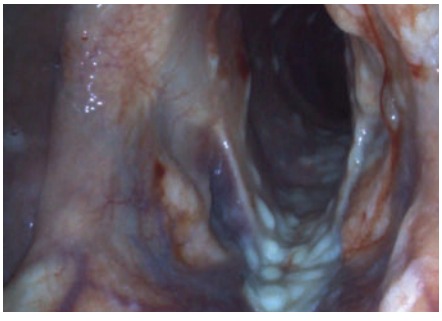
"If you don't get one under the control, you won't be able to control the other," stated Hodson.

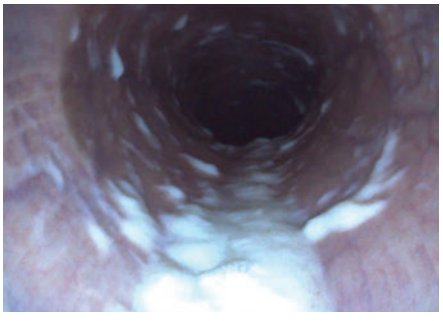
"You have to treat the whole horse," she said.—*Stacey Oke, DVM, MSc*



ARND BRONKHORST PHOTOGRAPHY

The treatment goals in severe equine asthma are to decrease airway inflammation, relieve bronchospasm and reduce mucous secretion.





COURTESY DR. KATE HODSON

be cheaper than other alternatives. Budesonide would be my first choice for nebulization, but the owner will need to purchase a nebulizer. Hence, this is the more expensive option."

Ciclesonide (Aservo EquiHaler), which has only been available in the United States since the spring of 2021, is a glucocorticoid product that is de-esterified in the horse's lung to its active metabolite. That metabolite has up to a 120-fold increase in glucocorticoid receptor binding affinity that ciclesonide itself (Pirie et al. 2020).

According to Couëtil, "This product has a very good safety profile and is effective in horses with SEA."

For example, Pirie et al. (2020) reported a success rate of 73.4% in 109 horses after 10 days of treatment (doses used in the study were eight actuations twice daily for five days, then 12 actuations once daily for the next five days).

Although used in some veterinary practices, Couëtil does not recommend nebulized dexamethasone as it "does not work in SEA." This was demonstrated in a study conducted by Wasseige et al. (2020) in six horses treated with 5 mg nebulized dexamethasone. Lung function tests showed no improvement following treatment (once daily for seven days). In that study, however, improvement in lung function was appreciated following orally administered dexamethasone (5 mg by mouth once daily for seven days).

That research further indicated that inhaled dexamethasone, but not ciclesonide or low-dose fluticasone, suppresses the hypothalamo-pituitary-adrenal (HPA) axis. This occurs when supraphysiologic doses of glucocorticoids suppress hypothalamic secretion of corticotrophin-releasing hormone and adrenocorticotropic hormone (ACTH) by the pituitary gland, resulting in secondary adrenal cortex atrophy.

With profound or prolonged ACTH deficiency, the adrenal glands might be temporarily unable to generate sufficient cortisol. The HPA axis plays a major role in the stress response and in host defense against infection. Suppression of the HPA axis results in an impaired stress response and an inadequate host defense against infection.

The goal of treatment is not only to improve inflammation but also to reverse smooth airway remodeling.

"Smooth muscles are arranged in a spiral formation around bronchi and bronchioles, and their contraction results in narrowing of the airway lumen," explained Couëtil. "This occurs normal-



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Owner compliance in controlling allergens in the horse's environment—such as changing bedding—can be difficult.



ARND BRONKHORST PHOTOGRAPHY

Soaking or steaming hay can be beneficial to horses with SEA.

ly to protect the lung from inhalation of irritants (e.g., feed particles, dust, ammonia). Chronic airway inflammation occurring in asthma, however, results in thickening of the smooth muscle and subsequently enhanced narrowing of the airway lumen. This makes it harder for horses to inhale."

In addition to decreasing inflammation in the airways, inhaled corticosteroids can also improve airway remodeling to some extent. In the study by Bullone et al. (2017), a combination of fluticasone and the long-acting β2 agonist salmeterol or fluticasone monotherapy improved peripheral smooth muscle remodeling after 12 weeks. But that improvement was no better than when horses were turned out to pasture, again highlighting the importance of control in cases of severe equine asthma.

Other therapies. Additional medications recommended for severe equine asthma include bronchodilators, mucolytic agents and omega-3 fatty acids as described in the ACVIM Consensus Statement (Couëtil et al. 2016).

In summary, Couëtil said that bronchodilators allow horses with severe equine asthma to improve clinically faster because they reduce the effort of breathing within minutes of administration. Mucolytic agents might help some horses in combination therapy but are not sufficient by themselves. Omega-3 polyunsaturated fatty acid supplementation can result in clinical improvement within a couple weeks when combined with reduced dust exposure (e.g., switching from hay to pelleted feed).

SEA in Daily Practice

With the seemingly "obvious" or pathognomonic clinical signs, diagnosing severe equine asthma might outwardly appear rather straightforward. Indeed, some owners pre-diagnose their horses before their veterinarians even see the animals. Further, some owners might have already decided that a short course of steroids will resolve those clinical signs, hopefully permanently.

"This is a condition in which we are practicing with one hand tied behind our backs," said Jake Jensen, DVM, partner at Janssen Veterinary Clinic in Sheridan, Indiana. "Most clients want to try empiric treatment first. Often it is only in the face of treatment failure will owners consider a BAL or referral."

Diagnosis

Kate Hodson, DVM, of Hodson Veterinary Services LLC in Hebron, Indiana, is in a good position as she has both the equipment and the wherewithal to perform BALs.

"That said, I have many backyard situations in which the owner's pocketbook is the major limiting factor, not equipment," said Hodson.

In Hodson's hands, a BAL can easily be performed in a backyard setting under light sedation, but the procedure requires two assistants—one to hold the horse and the other to serve as a "driver" for the endoscope. "This is a specialty procedure in my solo practice, and if I am super busy, then I need to refer my client to Purdue because they can get in faster," said Hodson.

Once the BAL fluid is collected, Hodson submits the fluid to Antech, which offers interpretation and can also offer guidelines.

Additional important points made by Hodson are that: 1) owner buy-in will be improved by explaining to them that horses tolerate the procedure very well, remain standing during the procedure, and are awake in 30 to 40 minutes; and 2) a transtracheal wash is not going to provide needed diagnostic information.

Considering that severe equine asthma is relatively common and should be definitively diagnosed prior to initiating treatment, practitioners might wish to consider continuing education to be-

come (more) adept at performing BALs.

Hodson encourages new practitioners to attend as many hands-on workshops as possible and to work with clinicians at referral centers.

"Phone a friend," Hodson quipped. "I e-mail Dr. Couëtil frequently for advice when managing difficult cases."

Jensen added: "One thing I find is that if I use the term 'equine asthma syndrome', then it helps owners understand that there will be long-term management. As a result, they may be inclined to be more aggressive up front with testing."

Treatment

Environmental control of allergens. In their survey, Simões et al., found that owners have poor compliance when it comes to minimizing allergen exposure. In that study, 39 horses diagnosed with severe equine asthma were included.

One year after giving clear instructions to owners of severely asthmatic horses, the study authors conducted a follow-up telephone interview. Owners were asked a series of questions regarding their current management routines. The goal of those questions was to determine whether the owners had followed the guidelines and whether the recommendations had a positive effect on the horses' respiratory tracts. The survey found that the overall compliance to the environmental management guidelines was poor.

Specifically the survey found:

- Compliance was deemed "extremely low" in 51.3% of the cases.
- More than half of the owners/managers implemented two or fewer of the six suggestions for allergen avoidance.
- Compliance was considered "good" in only 15.4% of cases (n=6), with owners implementing five to six of the recommended parameters.
- Only three owners/managers were able to adopt all six management recommendations.
- Four owners failed to adopt any management changes.

Not surprisingly, where there were no management changes implemented, the horses failed to show any clinical improvement over the course of that year and required corticosteroids and bronchodilators to control clinical signs of disease.

The two most difficult management strategies the study authors identified were hay soaking and keeping horses on pasture. At least 16 horses with severe equine asthma were continually maintained in stables with poor ventilation.

The easiest recommendation to adopt was a change in the type of bedding.

In Jensen's experience, owners are often "gung-ho" to try new types of bedding—such as dust-free shavings or cardboard—if the horse is housed at home. However, owner dedication to environmental change is often short-lived, he admitted.

More on Environmental Control

In addition to those referenced in research by Simões et al., key environmental control strategies recommended by Laurent Couëtil, DVM, DACVIM, associate professor of large animal medicine and director of the Equine Sports Medicine Center at Purdue University's College of Veterinary Medicine, include the following:

- Don't feed round bales without a covered feeder.
- Don't keep affected horses in the barn during cleaning.
- Don't feed hay in a hay net or rack in the stall.
- Do turn out horses to grass pasture and supplement with omega-3 fatty acids when grass is not available.
- Do feed horses from the ground.
- Do reduce dust exposure in severe equine asthma horses by wetting hay down or using hay steamers.

Here are some handy tips when soaking/steaming hay:

- Both soaking and steaming hay significantly reduce respirable dust particles.
- Soaking hay also reduces water-soluble carbohydrates (WSC). This can be of benefit for metabolic horses that require diets with restricted nonstructural carbohydrates. As pointed out by Kate Hodson, DVM, of Hodson Veterinary Services LLC in Hebron, Indiana, a number of horses with severe equine asthma are also metabolic.
- Soaking for 15-30 minutes will reduce WSC without resulting in nutrient deficiencies.
- Soaking too long leaches nutrients from the hay. Extended soaking might mean owners should offer horses a ration balancer or vitamin and mineral supplement.
- Steaming hay reduces bacterial counts almost entirely, thereby benefiting horses with severe equine asthma. In contrast, soaking hay increases bacterial counts and is considered less hygienic than steaming hay unless fed directly after soaking.

Horses appear to prefer steamed hay over soaked hay in terms of palatability.—*Stacey Oke, DVM, MSc*

As recognized in other studies on severe equine asthma, hay was identified as a trigger in a substantial number of cases (64.1%). According to the research team, owners appeared reluctant to change their horses' forage. Hay was not appropriately soaked but rather "sprinkled," which was ineffective as the center of the hay remained dry. Admittedly, hay soaking is time consuming, which likely explains why this management recommendation was poorly adopted.

"At boarding facilities, control of SEA is hard," explained Katie Coleman, DVM, of Premiere Equine Ambulatory Veterinary Service in Lemont, Illinois. "Owners have little control over most of the management of their horse because they're not there every day. Boarding facilities aren't usually willing to soak hay, and they typically have round bales out in the field. Managing asthmatic horses is much easier in privately owned and managed horses."

Jensen concurred, saying that owners capable of controlling their horses' environments at boarding facilities are few and far between.

Simões et al. suggested, "It is possibly easier for owners to adopt a change in protocol which solely involves a new purchase (e.g., wood shavings) rather than one that requires a change in everyday habits (e.g., turning out the horses or taking them from the stables during periods of increased activity) or modifications of infrastructures (e.g., ventilation)."

That said, the basic management strategies described earlier do appear efficacious, as the research noted that "increased compliance had an effect on the absence of respiratory effort at rest, absence of cough, decreased frequency of clinical signs, non-administration of pharmacological treatment, and clinical improvement of the horse."

Backyard horses. "The gold standard goes out the window sometimes with backyard horses," Hodson acknowledged. As a result, many horses are treated by primary practitioners with a short course of dexamethasone.

"This can be either oral or injectable, just to get the flare under control," said Jensen. After that initial treatment, Jensen attempts to have owners use inhalers. In his hands, the preloaded, one-time-use ciclesonide (Aservo EquiHaler) is useful short term for flare-ups, and budesonide through a nebulizer works well for longer-term management of severe equine asthma.



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BAL samples can help give veterinarians a definitive diagnosis.

Other therapies. "For horses with SEA that are breathing hard at rest, I typically prescribed clenbuterol and antihistamines in addition to the short tapering dose of dexamethasone," shared Hodson.

Jensen said he also uses clenbuterol, but only in short bursts because the horse's response to that medication decreases over time. He also routinely recommends an omega-3 supplement for his asthmatic horses.

Hodson said that inhalers have been a game changer: "Inhalers delivering bronchodilators such as albuterol directly to where they need to go have totally improved the quality of life of these horses."

That said, both Hodson and Jensen said that the number of owners using these inhalers are few and far between.

"But the Aservo product has made it much easier for owners compared with purchasing a nebulizer," Jensen said.

Pitfalls with Shortcuts

In the face of a "classic picture of asthma," it might be tempting to go ahead and treat with systemically administered corticosteroids such as dexamethasone or prednisolone. Indeed, prednisolone 1.1-2.2 mg/kg by mouth once daily does benefit horses with severe equine asthma, improving their clinical signs.

As mentioned above, blindly reaching for systemic corticosteroids can have important side effects (e.g., HPA axis suppression, laminitis), might not address underlying comorbidities, and could delay application of other beneficial therapies.

"Giving dexamethasone without decreasing dust exposure is like giving phenylbutazone to a lame horse without addressing the cause of the lameness," stated Couëtil.

Summary of Recommendations

Focusing on environmental management first is of utmost importance in effectively managing horses with severe equine asthma. As noted in the study by Simões, owner compliance is "pivotal." Veterinarians are challenged with effectively relaying to owners the "risks that are taken by lack of compliance," according to that study.

Couëtil said, "Environmental control to reduce dust exposure is essential, and pharmacological agents will help speed up resolution. It will take two to three months for horses to recover with just environmental control; three to six weeks when supplemented with omega-3 polyunsaturated fatty acids; and one to two weeks when combined with an inhaled corticosteroid."

Careful follow-up by veterinarians will identify an owner's adherence to management recommendations, which could have life-altering effects on the horse's long-term well-being. EM



Veterinarians and horse owners are feeling the stress related to the shortage of equine practitioners.

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Clients Speak Out

A survey of more than 1,700 horse owners revealed a need to increase awareness of issues facing the equine veterinary industry today.

By Amy L. Grice, VMD, MBA

In order to evaluate how horse owners experienced the availability of equine veterinary services during the challenges of the pandemic in 2020-2021 and what they are experiencing in 2022, a survey was prepared. The 21-question survey link was distributed by email invitations to subscribers of the equine magazines *Horse&Rider*, *Practical Horseman*, EQUUS and *The Horse* from May 24 until June 13, 2022, and 1,720 horse owners responded.

While all the magazines' readers share a deep interest in horses, there are differences in how they participate in the industry. *Horse&Rider* readers are strictly Western riders, including pleasure, ranch horses and competition. Subscribers to *Practical Horseman* are entirely English riders, focusing primarily on dressage, hunter/jumper and eventing. EQUUS magazine appeals to a broad audience fairly evenly split between English and Western riding, about half of which compete, and most of which are very involved in the equestrian lifestyle and have a keen interest in horsekeeping. Readers of *The Horse*, which is focused on horse health, describe themselves as hands-on horse owners. That audience also includes veterinarians. Of the total 1,720 respondents, the majority were readers of *The Horse* (57.8%), with the rest equally divided between *Horse&Rider* (14.2%), *Practical Horseman* (13.3%) and EQUUS (14.7%).

Where Were the Respondents?

In order to utilize demographic information about the respondents in analyzing the results, questions included the number of horses they owned and the zip code zone of those answering the survey. In addition, questions were asked about the type and size of the veterinary practices used by respondents.

Results indicated good participation



Zone 0	ME, VT, NH, MA, CT, RI, NJ	11.8%
Zone 1	NY, PA, DE	9.1%
Zone 2	MD, WV, VA, NC, SC	11.5%
Zone 3	TN, GA, FL, AL, MS	10.9%
Zone 4	MI, IN, OH, KY	11.1%
Zone 5	MT, ND, SD, IA, MN, WI	7.2%
Zone 6	IL, MO, NE, KS	6.2%
Zone 7	TX, AR, OK, LA	8.0%
Zone 8	ID, WY, CO, UT, NM, AZ, NV	8.9%
Zone 9	OR, WA, CA, AK, HI	15.4%

Figure 1. Geographic location of respondents

across all regions, and zip code zone 9 (which includes California, the #2 state for horse population according to the American Horse Council's 2017 study), had the highest number of respondents. Zip code zone 6 had the lowest number of participants. (See Figure 1.)

Practice Stats

The respondents' veterinarians worked at practices with fairly similar practice size to the 2016 AVMA AAEP Equine Economic Survey participants, with 50.3% of horse owners utilizing practices with two or fewer fulltime equivalent (FTE) veterinarians (the same size as 52.8% of practices in the AVMA AAEP survey). Solo veterinarians made up 30.2% of the practices used by horse owner respondents. Twenty percent reported using a two-doctor practice, while 28.3% used a firm with three to four full time equivalent (FTE) DVMs, the most prevalent size. An additional 11.3% utilized a five- to six-doctor practice, and 10.1% reported that their veterinarian came from a practice with more than six doctors.

When analyzed by zip code zone, differences were seen. Those in zip code zone 0 were least likely to use a solo practitioner (24.1%), while those in zip code zone 8 were most likely (37.4%). Those in zip code zone 3 were most likely to use a large practice with more than six doctors (14.5%), while those in zip code zone 6 were least likely (5.4%).

In rural areas, like much of zip code zone 6 and 8, larger practices might be less common due to lower population density in many areas. In contrast, areas with high concentrations of horses—such as the horse show destinations and racing centers of Florida—support multiple large practices. Most surprising was that zip code zone 4, which encompasses Kentucky and its mega-sized equine practices in the Lexington area, had only 9.3% of respondents who reported using a practice with more than six veterinarians. (See Figure 2.)

Horse owners also reported on the kind of practice at which their horses' veterinarians worked. A majority reported that they utilized an exclusively equine practice (52.7%), but there was some variation depending on the geographic location of the respondent, with only 45.3% in zip code zone 7 using this type of practice.

Utilization of mixed practices had an average of 27.6% nationally, but a spread of 18.5% in zip code zone 9 to 42.5% in zip code zone 6. These differences are likely due to the prevalence of mixed practices in rural areas with low population densities where there are not sufficient numbers of horses to support many exclusively equine practices. Respondents from central U.S. agricultural states in zip code zone 6 had the smallest number of horse owners using large animal practices, which was unexpected.

Those in the densely populated states of zip code zone 1 were most likely to use large animal practices (23.6%). One possible explanation is that because the Northeast has limited agriculture, predominantly equine practices often take care of residents' small numbers of farm animals and pet pigs, goats and sheep. (See Figure 3.)

Number of Horses Owned

Nationally, those owning just one horse was about 25%, but this varied by location, with 17.5% having just one in zip code zone 7, and 34.3% in zip code zone 0 reporting the same. The most common number of horses was two to three, with 42.1% of respondents, whereas four to five (16.6%) and more than five (16.2%) were tied.

Zip code zones 6 & 7 had the highest number of respondents with more than five horses. These regions include Texas (the state with the highest equine population) as well as the rural Midwest, where horse keeping is relatively inexpensive. (See Figure 4.)

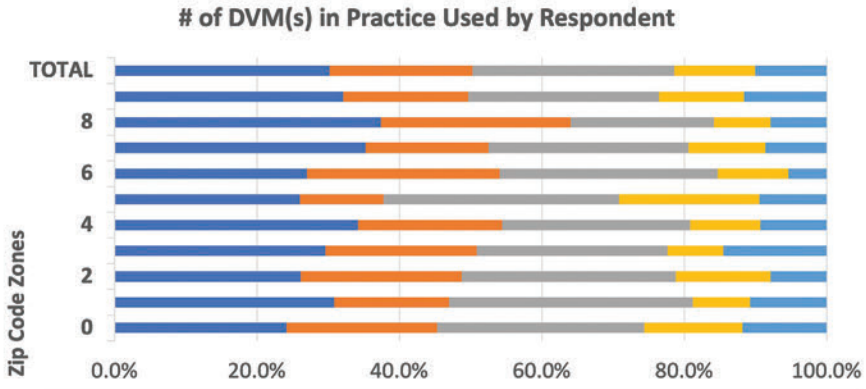
More or Fewer Horses

When asked whether they had the same number, more or fewer horses in 2022 than in 2020-2021, three-quarters (76.1%) of respondents answered that they had the same number. Nationally, only 5.9% had more.

Those from zip code zone 2 reported the most acquisitions of horses (8.4%), and those from zip code zone 1 reported the least (3.4%).

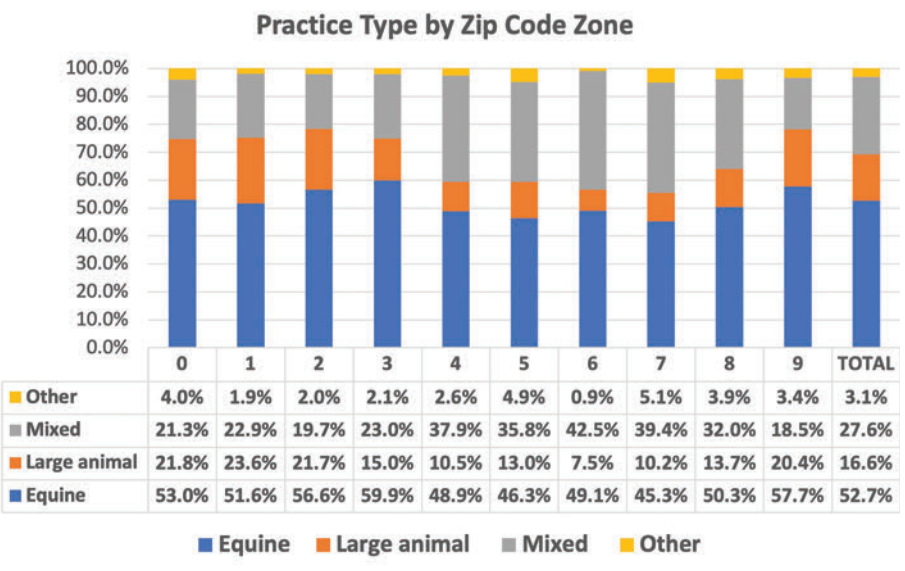
Across the country, 18.0% reported owning fewer horses, led by zip code zones 7 (23.6%) and 8 (22.3%). Those reporting the least number of horses lived in zip code zone 3 (15.1%). (See Figure 5.)

These figures are in contrast to those reported by the Zoetis American Horse Publications survey of 2021, in which 11% of respondents reported owning more horses in 2021 than 2020, 14% reported fewer horses, and 75% reported the same number. Although many people purchased horses during the pandemic, quality animals were in short supply, leading to rising prices. Perhaps those who reported fewer horses in 2022 had actually sold horses to owners new to the horse world, not yet plugged in to the horse publications, and therefore underrepresented in the current survey.



	0	1	2	3	4	5	6	7	8	9	TOTAL
1	24.1%	30.9%	26.1%	29.6%	34.2%	26.0%	27.0%	35.3%	37.4%	32.1%	30.2%
2	21.2%	16.1%	22.7%	21.2%	20.2%	11.8%	27.0%	17.3%	26.6%	17.5%	20.0%
3-4	29.1%	34.2%	30.0%	26.8%	26.4%	33.1%	30.6%	28.1%	20.1%	26.9%	28.3%
5-6	13.8%	8.1%	13.3%	7.8%	9.8%	19.7%	9.9%	10.8%	7.9%	11.9%	11.3%
>6	11.8%	10.7%	7.9%	14.5%	9.3%	9.4%	5.4%	8.6%	7.9%	11.6%	10.1%

Figure 2. Size of practices by number of veterinarians



	0	1	2	3	4	5	6	7	8	9	TOTAL
Other	4.0%	1.9%	2.0%	2.1%	2.6%	4.9%	0.9%	5.1%	3.9%	3.4%	3.1%
Mixed	21.3%	22.9%	19.7%	23.0%	37.9%	35.8%	42.5%	39.4%	32.0%	18.5%	27.6%
Large animal	21.8%	23.6%	21.7%	15.0%	10.5%	13.0%	7.5%	10.2%	13.7%	20.4%	16.6%
Equine	53.0%	51.6%	56.6%	59.9%	48.9%	46.3%	49.1%	45.3%	50.3%	57.7%	52.7%

Figure 3. Type of practice used by respondents

Vet Care Concerns

Horse owners were asked about their experiences and concerns with equine veterinary care during the pandemic in 2020-2021 and in the first half of 2022. A question for each of these periods asked, "What was your level of concern for availability of veterinary care for your horse or horses?"

Although nationally 30.5% of respondents reported having a high or moderate degree of concern in 2020-2021 and 24.7% had a minor degree of concern, different regions of the country not surprisingly had higher or lower concern, most likely due to the presence or absence of robust numbers of equine veterinarians. For instance, in zip code zone 9, 17.5% of respondents had a high level of concern in 2020-2021, but this fell to 11.9% in 2022. In contrast, 6.4% of zip code zone 6 respondents expressed a high level of concern in 2020-2021, and this remained at 6.3% in 2022. (See Figures 6 & 7.)

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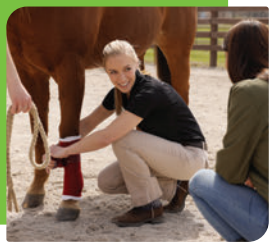
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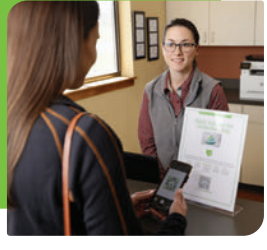
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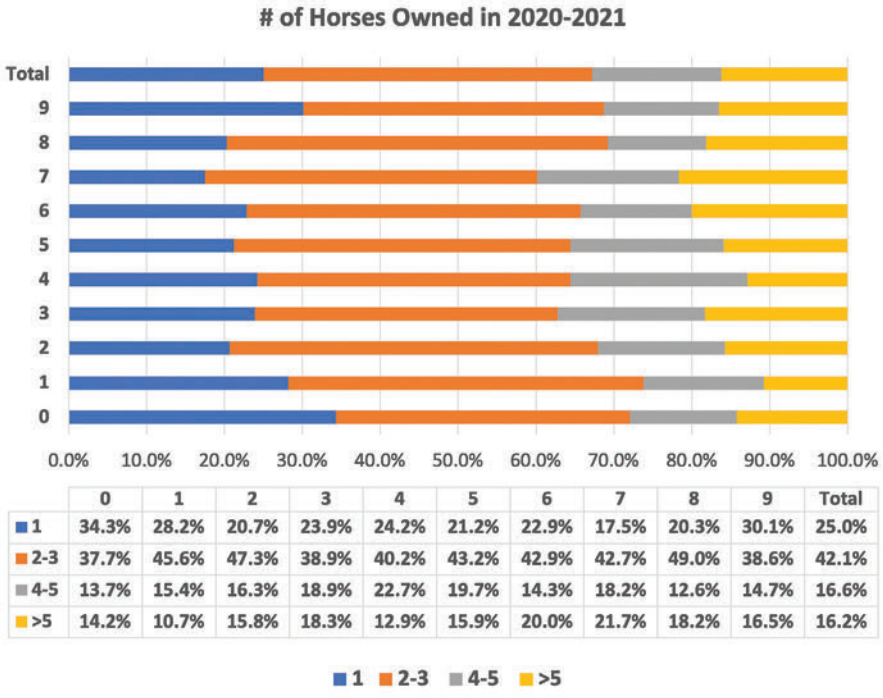
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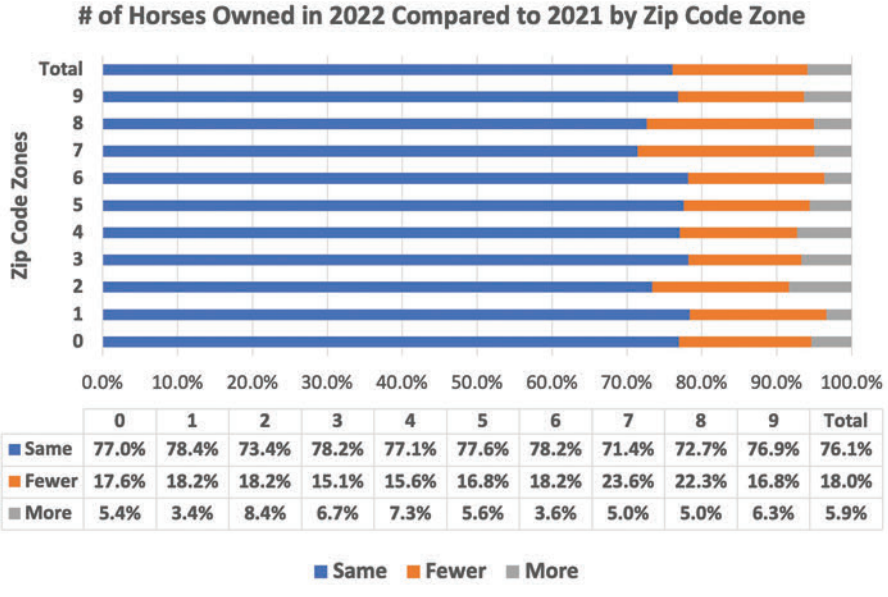
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	0	1	2	3	4	5	6	7	8	9	Total
1	34.3%	28.2%	20.7%	23.9%	24.2%	21.2%	22.9%	17.5%	20.3%	30.1%	25.0%
2-3	37.7%	45.6%	47.3%	38.9%	40.2%	43.2%	42.9%	42.7%	49.0%	38.6%	42.1%
4-5	13.7%	15.4%	16.3%	18.9%	22.7%	19.7%	14.3%	18.2%	12.6%	14.7%	16.6%
>5	14.2%	10.7%	15.8%	18.3%	12.9%	15.9%	20.0%	21.7%	18.2%	16.5%	16.2%

Figure 4. Number of horses owned in 2020-2021



	0	1	2	3	4	5	6	7	8	9	Total
Same	77.0%	78.4%	73.4%	78.2%	77.1%	77.6%	78.2%	71.4%	72.7%	76.9%	76.1%
Fewer	17.6%	18.2%	18.2%	15.1%	15.6%	16.8%	18.2%	23.6%	22.3%	16.8%	18.0%
More	5.4%	3.4%	8.4%	6.7%	7.3%	5.6%	3.6%	5.0%	5.0%	6.3%	5.9%

Figure 5. Number of horses owned in 2022 compared to 2021

ing the marked difficulty that equine practices are experiencing hiring and keeping equine associates, is that so few clients are worried about availability of care for their horses or actually experiencing difficulty in obtaining care. Unfortunately, this might indicate that those still working in equine practice are increasing the number of patients they see; thus they are experiencing higher workloads, which may accelerate stress and departure from the field.

It seems imperative that horse owners begin to realize that a crisis in the workforce of equine veterinarians might soon affect them.

A survey of veterinarians' experiences in 2020-2021, published in *EquiManagement*, indicated that not only are equine veterinarians working more hours, seeing more emergencies and adding more new clients, they are also exhausted and increasingly approaching burnout.

Horse Owner Comments

Comments made by some respondents in the horse owner survey revealed a sense of entitlement for veterinary medical services and a lack of understanding of the industry.

Said one, "We have had difficulty finding a veterinarian that does emergency calls. Our vet no longer offers this service. Guess she's making too much money to care about emergencies. We are in a very rural area."

Another opined, "I'm very concerned about the availability of standard pain medicines and antibiotics. Vets are very restrictive, limiting the amount prescribed and demanding to inspect the animal again—all at the cost to the consumer."

One of the worst comments was "Equine vets are absolutely DEPLORABLE here. You cannot be seen unless you purchase a 'wellness' package paid in FULL. That is $2K per horse. And does not cover anything but the vets' sometimes availability. You still incur trip fees, vaccines, drugs and whatever other services. That is $12,000.00 before I can get ANYONE to come out. I have well-cared-for retired show horses. I couldn't even get someone out to euthanize my old gelding. I had to do it myself. I can't get simple drugs like dex for heaves without paying $12K immediately. I will have to euthanize another horse because of this. This is completely UNACCEPTABLE. And this is not just from one practice either. It's several. The old vets are retiring, and these new ones are in it for the money only."

Other horse owners stated:

- "I am concerned that there is a

shortage of vets. Prices are outrageous since there is no competition, so horse owners are held hostage."

- "Equine veterinarians have mercenary attitudes and practices with incredible price increases ... talking down to knowledgeable and well-schooled horse owners with a total lack of respect for their prior experience and expertise, and the dismissal of owners' rights to vaccinate their own animals."

Perhaps these people have forgotten that horses are a luxury item, not a basic necessity of life. Business owners can set whatever policies and prices they wish, and consumers can choose whether or not to purchase.

A bright spot was the number of positive comments that showed some understanding and gratitude for their horses' doctors: "My vets are prompt, very capable and compassionate" and "I am extremely fortunate to have a caring and responsive vet team."

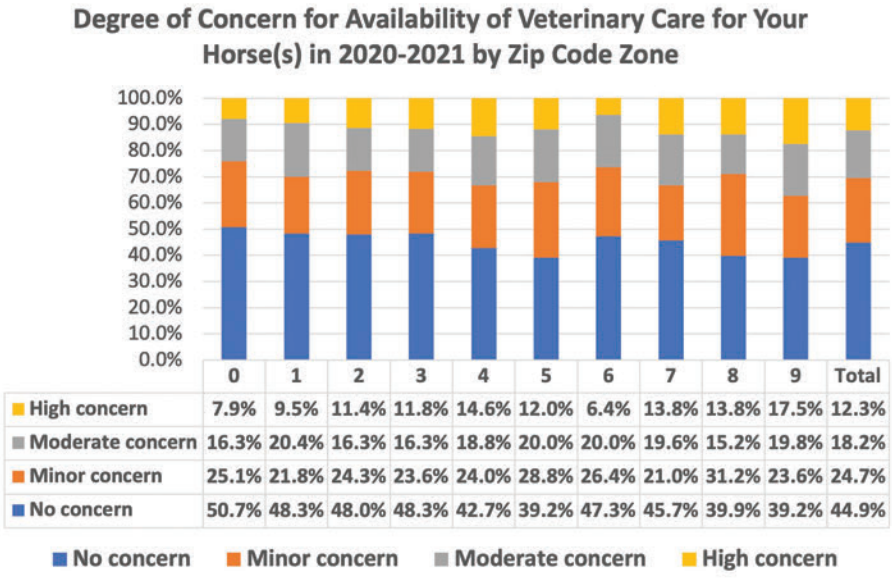
One respondent from zip code zone 5 commented, "We are burning out our area vets. Housing costs for new vets are also driving them away from our community."

Another said, "I respect my equine vet so much—I would highly recommend her because she is very competent, kind and intelligent."

A reply with no concerns said, "We have no trouble with availability. Our vets are amazing and thorough."

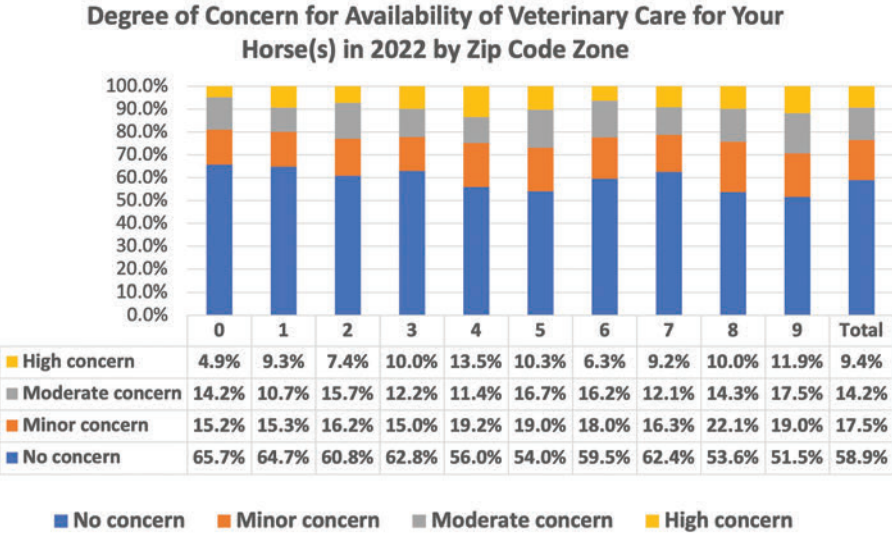
A horse owner who clearly has been paying attention said, "I am concerned by the lack of equine vets and the stress that overload puts on the current veterinary professionals. This is in addition to the cost and debt load a veterinarian has to juggle coming out of vet school and trying to start a practice."

The worry about availability is palpable in comments such as: "I live in a rural area with one horse vet with no help. He is seriously overextended and getting older, with no new vets going into equine practice!" and "Emergency



	0	1	2	3	4	5	6	7	8	9	Total
High concern	7.9%	9.5%	11.4%	11.8%	14.6%	12.0%	6.4%	13.8%	13.8%	17.5%	12.3%
Moderate concern	16.3%	20.4%	16.3%	16.3%	18.8%	20.0%	20.0%	19.6%	15.2%	19.8%	18.2%
Minor concern	25.1%	21.8%	24.3%	23.6%	24.0%	28.8%	26.4%	21.0%	31.2%	23.6%	24.7%
No concern	50.7%	48.3%	48.0%	48.3%	42.7%	39.2%	47.3%	45.7%	39.9%	39.2%	44.9%

Figure 6. Degree of concern for availability of equine veterinary care in 2020-2021

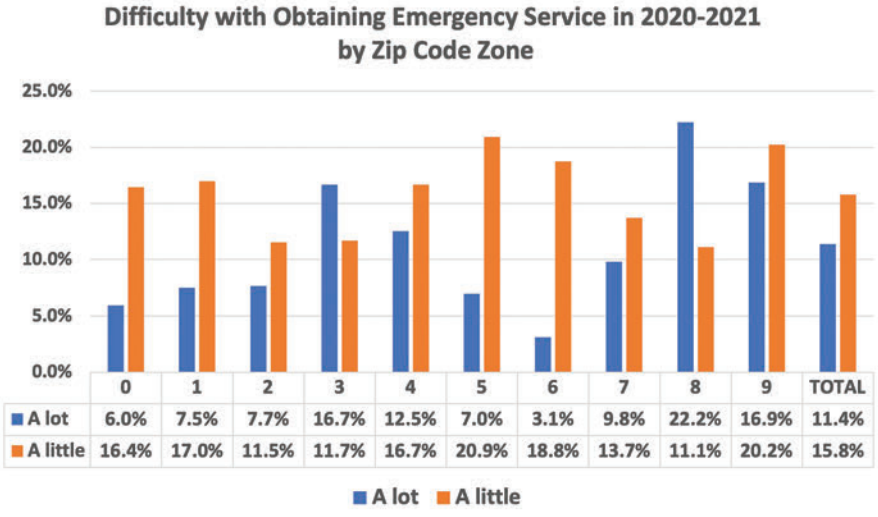


	0	1	2	3	4	5	6	7	8	9	Total
High concern	4.9%	9.3%	7.4%	10.0%	13.5%	10.3%	6.3%	9.2%	10.0%	11.9%	9.4%
Moderate concern	14.2%	10.7%	15.7%	12.2%	11.4%	16.7%	16.2%	12.1%	14.3%	17.5%	14.2%
Minor concern	15.2%	15.3%	16.2%	15.0%	19.2%	19.0%	18.0%	16.3%	22.1%	19.0%	17.5%
No concern	65.7%	64.7%	60.8%	62.8%	56.0%	54.0%	59.5%	62.4%	53.6%	51.5%	58.9%

Figure 7. Degree of concern for availability of equine veterinary care in 2022

care is nil to none in my area. My horse colicked twice in April and no mobile vet was able to come. I called the equine emergency number, and four hours later they called back when I was already en route to my usual veterinary office an hour away. Thankfully, he didn't go down in the trailer. There are no ambulatory veterinary services for an emergency."

A thoughtful owner stated, "I think the veterinarian and vet support staff shortage is very concerning, especially with the extremely low amount of newly graduated vets that want to practice equine medicine or are leaving the profession or going into small animal practice. I think horse owners need to be aware of the situation and how hard it is on our current vets, along with the increasing suicide rates in the profession. And I think horse owners need to take ownership of their behavior that drives good vets out of the profession



	0	1	2	3	4	5	6	7	8	9	TOTAL
A lot	6.0%	7.5%	7.7%	16.7%	12.5%	7.0%	3.1%	9.8%	22.2%	16.9%	11.4%
A little	16.4%	17.0%	11.5%	11.7%	16.7%	20.9%	18.8%	13.7%	11.1%	20.2%	15.8%

Figure 8. Difficulty obtaining emergency service in 2020-2021

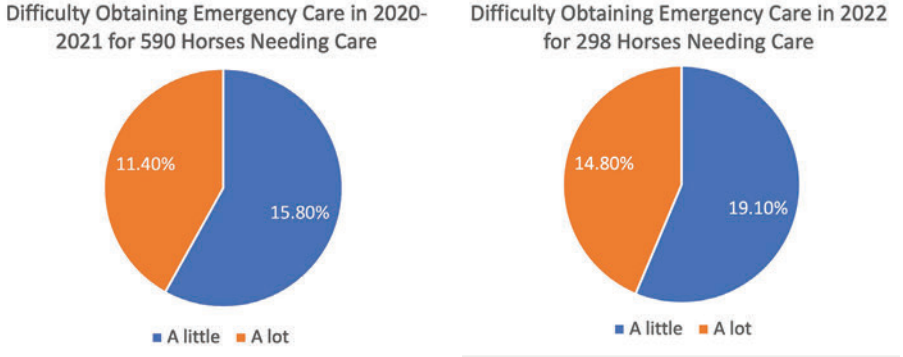


Figure 9. Difficulty obtaining emergency care in 2020-2021 and 2022

and look to improve their relationship with their current vets."

Some comments supported the perspective that clients need to change their stance toward their veterinarians, as multiple respondents complained that new veterinarians were unskilled compared to their older retiring practitioners. For instance, one said, "It seems that many vets are retiring now, and the newer generation is less well-equipped to handle unusual diagnoses and/or perform treatments in a farm setting. My previous vet of 20 years was able to diagnose and treat an amazing array of situations on site. The newer vets I have tried want to immediately admit an animal to a clinic or hospital, rather than follow through to complete the necessary course of treatment."

Perhaps clients are unaccustomed to being offered a higher standard of care, and do not feel they are offered a range of treatment options. Or maybe they feel judged if they are offered options and do not feel they can afford the best care. Not being offered options, but instead simply having their veterinarian assume they only want what can be done on the farm, might make these clients more comfortable. However, best practices to give the best care as well as avoid malpractice claims are to offer the optimal treatment as well as a menu of other choices.

Another respondent stated, "There are too many young, inexperienced vets these days." Still another horse owner said, "My issues with veterinary care are with the attitude of younger vets. They wish to perform more tests, adding expense, and are available fewer hours—some not at all for emergencies."

It seems that veterinarians might need to develop additional communication skills to help clients understand the changes in veterinary medicine that have occurred in the last few decades.

Could Owners Get Care?

A series of questions then queried the amount of difficulty horse owners had in receiving routine care, elective surgical care, urgent care and emergency care during each of these time frames.

Of those respondents who scheduled routine care in 2020-2021, 5.2% experienced major difficulty, including 9.3% of those in zip code zone 9. In 2022, only 4.3% of respondents who scheduled routine care had major difficulty, with zip code zone 9 dropping to 6.9%.

Elective surgical care was only sought by 239 of the 1,720 respondents in 2020-2021, with 23.4% having a little or a lot of difficulty being scheduled. In the first six months of 2022, just 129 of the 1,720 respondents scheduled this type of care, but 27.9% reported difficulty.

Another question concerned urgent care needed for minor injuries or sickness, such as lameness or excessive coughing. In 2020-2021, 813 of the surveyed horse owners needed this care, and 25.9% reported having a little or a lot of difficulty being scheduled. In the first half of 2022, 616 scheduled urgent care, with 25.9% again indicating some level of difficulty.

Emergency care was also subject to difficulty in scheduling care. Nationally, 27.2% of the respondents needing emergency care for their horses reported difficulty in 2020-2021, with 11.4% experiencing a lot of difficulty and 15.8% reporting a little difficulty. Zip code zones 8, 9 and 3 reported the highest percentages of a lot of difficulty, while zip code zone 6 reported the least. (See Figure 8.)

Respondents expressed concern about this development. One said, "There are now weekends where there is not a single vet available for an emergency visit (outside of going to the hospital). More distant (45-60 minutes' drive away) vets won't even return phone calls."

Another shared, "Emergency coverage in my area for horse care is horrible. Fortunately, I have a trailer and can haul to a clinic 1½ hours away. My routine vet is great but often not available and is 1 hour away. Weekend emergency calls go unanswered by vets! They are now taking the stance you must be their clients for them to come for an emergency."

In the first half of 2022, 19.1% of the 298 respondents whose horses needed emergency care reported a little difficulty in obtaining care, and 14.8% reported a lot of difficulty. This is a sharp jump from the figures reported in the previous two years. (See Figure 9.)

As fewer equine doctors remain in practice, this lack of coverage is likely to increase in many areas.

In order for veterinarians to provide care to horses in need most efficiently, horse owners will increasingly be asked to haul into local clinics or referral centers. Many practices have higher emergency fees for non-clients or do not provide emergency services at all to those who are not regular clients.

With fewer veterinarians in the equine field, the pressures of emergency care increase, which can then push more doctors into companion animal positions where emergency services are not required. This causes an ever-worsening cycle.

Clients need to be educated about the current realities in the industry. Having a relationship with a veterinarian, utilizing routine health maintenance services, and being ready and able to transport their horses during an emergency are all ways that clients can assure emergency service access for their horses. This need in the industry also offers opportunities for equine practitioners that enjoy emergency work to consider opening emergency-only practices in areas with adequate horse numbers to support this service. Smaller practices might subscribe to an equine emergency service to reduce on-call responsibilities for their veterinarians and thus increase their retention in the field.

Yes, used 2020-2021	6.6%	4.8%	5.5%	6.4%	**6.1%**
Yes, didn't use	5.7%	6.6%	5.5%	6.0%	6.0%
No, but wanted it	32.4%	31.0%	31.2%	31.3%	**31.4%**
No, and didn't want it	19.3%	21.0%	22.1%	18.5%	**19.5%**
Unsure	36.1%	36.7%	35.6%	37.7%	**37.0%**
TOTAL	100.0%	100.0%	100.0%	100.0%	**100.0%**
Yes, used 2022	3.7%	3.5%	4.7%	5.0%	**4.6%**
Yes, didn't use	5.7%	5.7%	3.2%	5.4%	5.2%
No, but wanted it	31.6%	30.6%	29.2%	27.4%	**28.7%**
No, and didn't want it	16.0%	17.9%	20.6%	16.4%	17.2%
Unsure	43.0%	42.4%	42.3%	45.8%	**44.4%**
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%

Figure 10. Use of telemedicine

Telemedicine Use

Telemedicine has been adopted widely in human medicine, and overall, patients are very pleased with the convenience of the service. However, in equine veterinary medicine, utilization of this new trend has been lower.

Very few practices offered telemedicine in the years studied (12.1% in 2020-2021, and 9.8% in 2022), according to the respondents, but quite a few wanted it offered. (See Figure 9.)

The largest proportion of horse owners reported being unsure whether telemedicine was offered. This might signal an opportunity for practices to educate clients about a lower-cost, efficient service for minor concerns, rechecks or other issues.

One respondent said, "I hate the idea of useless telemedicine appointments. If you don't want to put your hands on a patient, you shouldn't be a doctor/veterinarian. Period." Perhaps this owner would be more grateful for this option if there were no equine veterinarians available in his/her county.

Take-Home Message

The results of this study of horse owners illustrate the changes that many equine practices are currently living. Fewer equine veterinarians during a time when horse numbers are stable or rising slightly means more horses to care for per veterinarian. Rural areas are feeling the pinch more than suburban areas due to longer distances and lower horse population density.

Equine doctors are feeling the stress of being unable to serve all their patients' needs while still maintaining a healthy amount of time away from work. The horse owners who do not have an understanding of and appreciation for the challenges of equine veterinarians make the profession less appealing to new entrants. Those clients who understand the pressures in the current equine veterinary industry are patient, thoughtful and appreciative of their horses' doctors.

Increasing the awareness of all stakeholders in the equine industry about the current issues in the veterinary industry is a necessary part of ensuring that all horses can receive the care they need now and into the future. EM

NATURE'S ANTIMICROBIALS

Research shows medical grade Honey and Silver have antimicrobial properties.

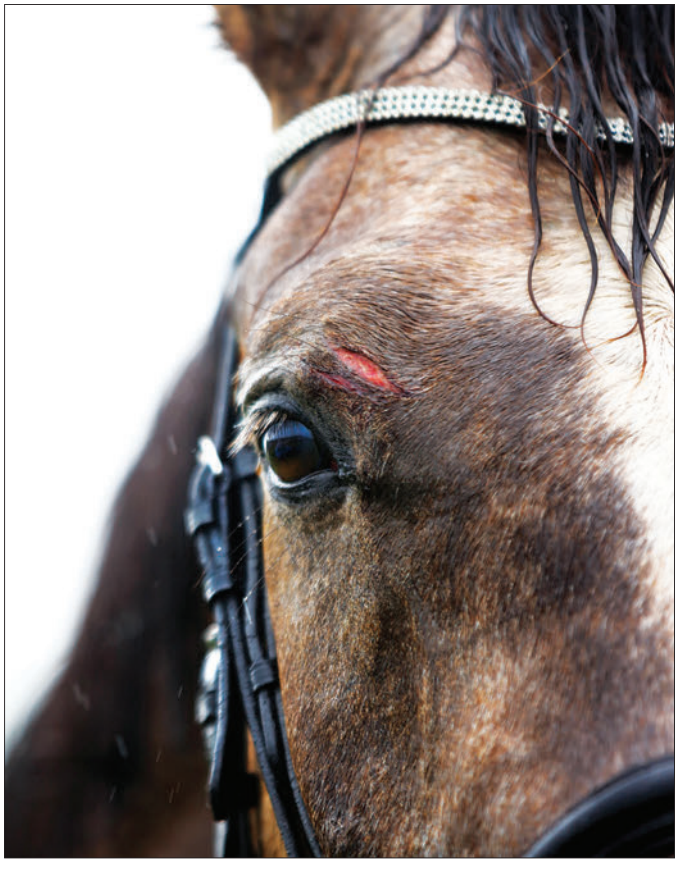
Honey and silver have been used for thousands of years to treat human wounds and skin conditions. With the increasing development of multi-drug resistant bacteria, use of an alternative antimicrobial agents such as medical grade honey and silver have value in treating wounds in horses.

Researchers have noted three different ways that silver acts on microbes *Antibiotics* 2018, v. 7(4); ncbi.nlm.nih.gov/pmc/articles/PMC6315945]. Those researchers said:

- "Firstly, silver cations can form pores and puncture the bacterial cell wall by reacting with the peptidoglycan component.
- "Secondly, silver ions can enter into the bacterial cell, both inhibiting cellular respiration and disrupting metabolic pathways resulting in generation of reactive oxygen species.
- "Lastly, once in the cell, silver can also disrupt DNA and its replication cycle."

Keep in mind the therapeutic properties of honey depend on the type of honey used. Manuka honey, derived from the New Zealand tea tree/bush, has the greatest degree of antimicrobial properties.

Veterinarians who utilize Manuka honey know that for optimal results, the wound must be prepared by removing exudate and devitalized or necrotic tissue. A field trial of Silver Honey Ointment showed that the product helped loosen and remove scabs to enhance wound and skin healing.

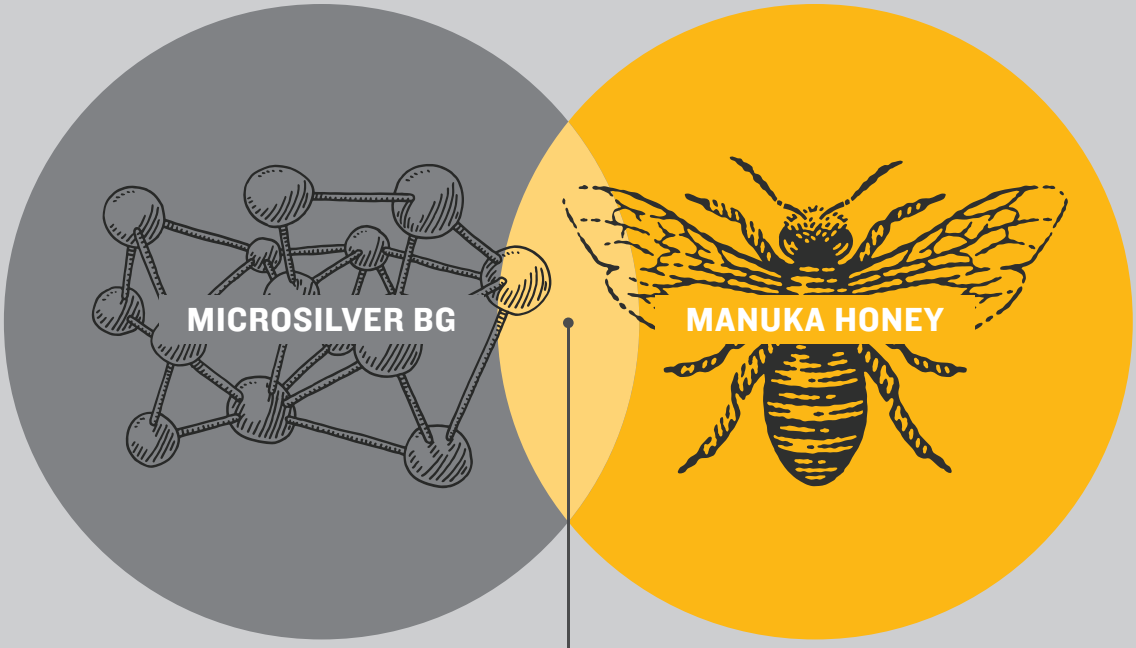


W.F. Young has combined these two natural antimicrobials with medical-grade ingredients into one equine wound and skin care product—Silver Honey.

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Some key properties of honey are important for wound resolution:

- The acidic nature of honey—pH 3.2-4.5—inhibits bacterial growth and assists macrophages in bacterial destruction.
- Glucose oxidase enzymes produce hydrogen peroxide (inhibine), which is an effective antibacterial. The hydrogen peroxide produced is about 1,000 times less than the concentration found in commercially available 3% hydrogen peroxide solution, so it can exert antimicrobial action without fibroblast or tissue damage.
- Honey aids in proliferation of B and T lymphocytes as well as activation of phagocytes.
- Honey is effective at reducing formation of biofilms.
- Manuka honey has an additional phytochemical anti-bacterial component, methylgloxal [*AIMS Microbiology* 2018, 4(4): 655–664. DOI: 10.3934/microbiol.2018.4.655].
- The viscous nature of honey forms a barrier to protect wounds from cross-contamination. EM



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Owners find equine metabolic syndrome confusing, so many horses can go undiagnosed and untreated.

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Diagnosing and Managing EMS Cases

Educating owners will help minimize the devastating effects of equine metabolic syndrome (EMS).

By Stacey Oke, DVM, MSc

Of all the endocrine disorders affecting horses, equine metabolic syndrome (EMS) is the newest, which at least partly explains why so many questions persist regarding diagnosis and management. Not only do equine practitioners need to continually educate themselves regarding equine metabolic syndrome guidelines, but we also need to effectively relay the newest information to our clients.

According to a recently published survey, this is no small feat (Golding et al. 2021). That survey highlighted the fact that horse owners find equine metabolic syndrome confusing, leaving many horses undiagnosed, untreated and at risk of laminitis.

In that study, 491 horse owners were surveyed regarding their knowledge of eight different conditions, including equine metabolic syndrome. Owners reported they had very poor knowledge of equine metabolic syndrome, and one in five reported having never heard of this condition at all. That dearth of knowledge was not due to lack of experience in the equine industry, as most survey respondents (77%) were experienced or very experienced. Instead, lack of education and educational materials appeared to be a common barrier.

More than one-third of survey respondents indicated that they had not even searched for information on equine metabolic syndrome, while at the same time 43% thought that there was inadequate information available on the condition.

These data highlight the importance of client education by veterinarians. In turn, equine practitioners must also be up to date on the latest information pertaining to this disease. The key features of equine metabolic syndrome, a brief description of the nuances associated with testing/diagnosing this condition, and the basics of managing affected horses are provided in this article.

The information relayed in here relies heavily on the information included in the most recent guidelines on equine metabolic syndrome published in 2019, which are available in an open access article found at https://onlinelibrary.wiley.com/doi/10.1111/jvim.15423 (from Durham et al. 2019) as well as those produced by the Equine Endocrinology Group available at sites.tufts.edu/equineendogroup/.



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The most important clinical consequence of insulin dysregulation is hyperinsulinemia-associated laminitis.

EMS Basics

"EMS is a collection of risk factors for laminitis," explained Nicholas Frank, DVM, PhD, DACVIM, a professor of large animal internal medicine and associate dean for academic affairs at the Cummings School of Veterinary Medicine at Tufts University in North Grafton, Massachusetts. "Insulin dysregulation (ID) is the most important risk factor, and it must be present for us to say that a horse has EMS."

According to Frank, additional factors include:

- readily becoming obese (affected horses are often referred to as "easy keepers");
- abnormal fat deposition within the neck crest, around the tail head, sheath or mammary gland, or increased internal fat stores; and
- higher than normal blood triglyceride concentrations.

Further, concentrations of hormones secreted from fat tissues (adipokines) are also affected in some horses with EMS.

"Hyperinsulinemia-associated laminitis (HAL) is the most important clinical consequence of EMS, and it can lead to chronic pain and significant damage to the feet," Frank explained.

Insulin dysregulation is defined by the presence of hyperinsulinemia and/or insulin resistance, which is a decreased ability of insulin to move glucose into tissues.

To clarify the use of the different definitions, Frank said, "You can say that a horse has ID alone if it is the only abnormality detected or that they have EMS if any of the other risk factors are also present. In either case, ID increases the risk for laminitis, and we need to lower blood insulin concentrations as soon as possible."

The Clinical Picture of EMS

The prevalence of equine metabolic syndrome is about 20% in the general light-horse population in the United States, but this condition occurs more commonly in certain horse breeds, as well as ponies and donkeys. Those might include Andalusians, Arabians, Morgan horses, Paso Finos, Shetland ponies and Welsh ponies.

Frank said that owners of horses from higher-risk breeds should be particularly concerned about equine metabolic syndrome, but he said that all horse owners need to be aware of the risk factors for laminitis. "If a horse has a higher-than-normal blood insulin concentration, readily becomes obese or develops excess fat deposits in the neck or elsewhere on the body, then allowing them to eat high-sugar feeds or pasture grass might precipitate an episode of laminitis," he said.

Clinical findings suggestive of equine metabolic syndrome include unexplained mild lameness (subclinical laminitis), the presence of divergent hoof rings or "founder lines" on the feet, being an easy keeper, or having a cresty neck or increased fat deposits around the tail head, sheath or mammary gland.

Be aware, however, that while obesity and a sedentary lifestyle are often attributed to equine metabolic syndrome, not all horses with the condition are obese, and they could be missed. Blood insulin concentrations should be measured to assess any horse that you have concerns about.

Diagnostic Testing

Blood insulin concentrations can be checked using two approaches. "A simple approach is to collect a blood sample after the horse has only been eating hay (no grain) and measure plasma insulin concentrations," said Frank. "If the insulin concentration is higher than normal, the horse suffers from hyperinsulinemia and therefore ID.

"If a horse is moderately or severely affected by ID, this test will be positive, but mildly affected horses can have normal results, so the test has limitations," Frank warned.

Cutoff values are usually provided by the referral laboratory, and the Equine Endocrinology Group recommendations are available online (sites.tufts.edu/equineendogroup/).



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EMS occurs more commonly in certain horse breeds, ponies and donkeys.

Comorbidities: Insulin Deficiency Plus PPID

Always test horses suspected of having insulin deficiency for pituitary pars intermedia dysfunction (PPID or equine Cushing's disease)! There are similarities between the clinical manifestations of PPID and equine metabolic syndrome, and the two conditions cannot be differentiated based on presentation alone. Further, there are horses in which the two entities coexist. This holds particularly true for horses over 10 years of age. See the guidelines from the Equine Endocrinology Group for which tests to perform and in which order to diagnose equine metabolic syndrome with or without PPID.—Stacey Oke, DVM

The second approach is to perform an oral sugar test (OST), which fully assesses the horse and detects mild, moderate or severe insulin deficiency. This test involves administering a measured dose of Karo Lite corn syrup to the horse by mouth and drawing blood samples 60 and 90 minutes later. Giving corn syrup stimulates insulin release, and horses with insulin deficiency have higher-than-normal responses to oral sugars.

Key Management Strategies

Generally speaking, horses with EMS are obese and sedentary, although as mentioned earlier there are exceptions to this rule. The three main ways to manage horses with EMS are:

- decrease nonstructural carbohydrate (NSC) intake;
- encourage body fat loss; and
- exercise.

Detailed instructions on each of these three prongs of management are included in the 2019 European College of Equine Internal Medicine (ECEIM) EMS Guidelines (the open access article can be found at https://pubmed.ncbi.nlm.nih.gov/30724412/). Some additional thoughts to ponder when instituting those recommendations include being sure to balance concerns about gastrointestinal health and the horse's well-being when decreasing the amount of feed provided.

Frank noted, "Horses are designed to graze throughout the day (about 16 hours if left to their own devices), and the grass or hay entering the stomach buffers the acid secreted and decreases the risk of gastric ulcers forming. In addition, forage quantity and quality will also impact the overall health of the intestinal microbiome, which is essential for the overall health and well-being of any horse. Housing the horse in a small paddock with a companion is recommended to enhance well-being, as well as selecting hay with lower energy content so that larger amounts can be fed.

The guidelines recommended:

- Consider soaking the hay (from 30 minutes to 1 hour in cold water) to lower the NSC content of the hay. But be cautious about over-soaking because important vitamins and minerals can be leached from the hay. A low-NSC ration balancer is recommended.
- Add a vitamin E supplement for EMS horses with limited access to grazing.
- For horses with moderate or severe insulin dysregulation, analyze the hay to determine the NSC content.

Carey Williams, PhD, equine extension specialist and associate director of the Rutgers University Equine Science Center, described how to have hay tested. She said, "The proper and most accurate way of testing hay is using a core sampler. Some county extension offices will loan/rent these tools out. Take about three core samples from 10% of the hay in the load or batch. If that is not practical, hand grab about three samples from the center of the bale, sampling about 10% of your load of hay. Aim for at least 10 bales in a large load."

Next, Williams advised putting the samples in a bucket and mixing them together. Transfer a subsample from the bucket into a large Ziploc bag, making sure to also get the fines, which are the small particles in the bottom of the bucket. Send that bag to an analytical laboratory such as Equi-Analytical Labs (which is the most commonly used forage-testing facility and can be found at equi-analytical.com) or a comparable company. According to Williams, there are various testing packages to choose from, with some as cheap as $18-$20 for just the carbohydrate fractions and others up to $60-$90 that includes all the minerals.

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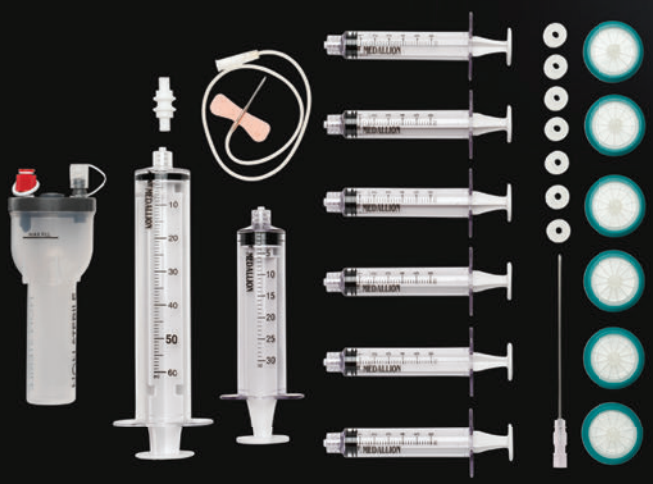
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Restricting horses with insulin dysregulation from pasture is one step in preventing laminitis in those animals.

testing might not be feasible, and many hay growers or dealers will not have their hay tested," said Williams. "Be aware that there is no way to *estimate* soluble carbohydrate fractions of hay. So, if someone tells you they can, I would be skeptical and get proof by analyzing it!"

If an owner is concerned about sugars and starches in forage, it would be smart to soak the hay. Soaking for even just 30 minutes in cold water can remove about 30% of the soluble carbohydrates, including sugar and starch, said Williams.

"Soaking hay would be wise for horses at boarding barns where the hay is too variable to test," she noted. "It does not need to soak for very long, and using a muck tub or wheelbarrow is an easy way to soak an entire hay net."

Frank added, "Management strategies are effective in most cases, but some horses require medical treatments prescribed by veterinarians. For example, levothyroxine can be administered to induce weight loss, and new drugs called sodium-glucose cotransporter 2 (SGLT2) inhibitors lower blood insulin concentrations."

Felled by Founder

The most important clinical consequence of insulin dysregulation is hyperinsulinemia-associated laminitis (HAL), which is the most common form of laminitis. It is more common than inflammatory induced (e.g., following placentitis, colitis), carbohydrate overload or supporting limb laminitis.

"Prolonged hyperinsulinemia induces laminitis, and this form of laminitis has different pathologic features to that of an inflammatory-induced laminitis," explained Professor Martin Sillence, PhD, academic program director (Science) at Queensland University of Technology. Sillence has academic degrees in Pharmacology, Further Education, and Animal Physiology and Nutrition.

He said, "Changes in the foot are initially observed in the secondary epidermal lamella (SEL), characterized by lengthening, narrowing and tapering of those SELs; however, the precise mechanisms responsible for HAL remain unclear."

Suggested theories include glucose toxicity, matrix metalloproteinase up-regulation or over-stimulation of insulin-like growth factor receptors causing increased cell proliferation.

HAL should not be taken lightly, as one study showed that one-third of horses diagnosed with HAL are euthanized within the first year of being diagnosed, and HAL will recur in approximately one-third of "recovered" horses (de Laat et al., 2019).

Once horses become laminitic, key questions owners might ask are: 1) What are the chances of the horse recovering? and 2) How long will the recovery process take?

Sillence and his team at Queensland University of Technology have worked closely with Boehringer Ingelheim Vetmedica and a team of equine clinicians in Germany to answer these questions.

Sillence and colleagues analyzed data collected from 37 horses diagnosed with naturally occurring HAL from 16 equine clinics located in Germany. Laminitis severity was assessed in each of those horses on Day 0 (the day they entered the trial) and again on Days 4, 9, 14, 25 and 42.

For the first nine days of the study, horses were confined to stalls/rested and restricted to hay-only diets, with some fitted with supportive pads and bandages.

After the first nine days, management—including diet—was as prescribed by the individual veterinarian managing the case. Included horses were allowed non-steroidal anti-inflammatory drugs but not levothyroxine, metformin or corticosteroids.

Of the included 37 equids, 19 (51%) were horses, the median age was 17 years, and 81% were fat or very fat. Further, 57% had a history of laminitis.

"When the individual clinical laminitis scores were plotted against time, almost three-quarters of the horses improved rapidly, within two weeks of the onset of laminitis," said Sillence. "Those horses had a median laminitis lameness score of 0 by Day 14.

"The remaining equids—about one in four—improved much slower, with a laminitis lameness score of 5 out of 12 by Day 14," he added.

Three key variables associated with a more rapid rate of improvement were age, blood glucose and insulin levels.

Younger horses were more likely to recovery slowly. And while circulating insulin and glucose levels were within the normal range in all horses after transitioning to the hay-only diet in the first nine days, levels of insulin and glucose were still slightly higher in the slow responders than the fast responders.

"An important message here is that we found a link between insulin, glucose and slower recovery, which is consistent with insulin being the causative agent of HAL," noted Sillence. "We have a good idea of the insulin threshold for triggering moderately severe HAL from earlier studies in ponies. Beyond that threshold, we showed that the risk of laminitis increased in proportion to their insulin concentration. But the study on laminitis recovery has led us to understand that more work is needed before we can know how much insulin is needed to cause moderate damage to the hoof or impair recovery."

Another interesting aspect of the study was that a 12-point lameness scale was used in addition to the traditional five-point Obel scale. Sillence and colleagues found that the Obel was not detailed enough to be able to detect subtle changes in lameness. (See the article by Meier et al. 2021 for additional information on the 12-point lameness scale proposed for HAL.)

When horses develop HAL, veterinarians can re-evaluate lameness after about four days, as horses that recover well should show some improvement by then.

"If there is no improvement after four days, then the diet should be revisited," said Sillence.

Take-Home Message

Equine metabolic disease and insulin dysregulation occur commonly and have important clinical consequences, particularly HAL. As many owners are unfamiliar with equine metabolic syndrome, veterinarians need to actively educate owners regarding this condition to facilitate early diagnosis and intervention.

Sillence said, "HAL is hard to manage but is preventable with appropriate diet and/or medications, such as insulin-lowering agents, even in some of the most difficult cases. We are actively researching preventive and treatment strategies." EM





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Horse owners should expect to pay more for hay this year, so veterinarians will have to help them understand forage options.

Feeding Forage First

With dry hay production in 2022 expected to be the lowest in 115 years, veterinarians will need to help clients understand options for forage-first horse diets.

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By Katie Navarra

Horses evolved eating diets that are high in fiber. While veterinarians and most horse owners understand that, it's good to help clients "return to basics" in feeding their horses.

About 60% of a horse's digestive tract volume is dedicated to forage fermentation, according to Clair Thunes, MS, PhD, an equine nutrition consultant and owner of Clarity Equine Nutrition. "To honor that digestive anatomy, it is important that forage makes up the majority of the diet for most horses," she said.

Providing forage first helps to get the gut working positively, according to Robert Coleman, PAS, PhD, an equine extension specialist for the University of Kentucky. Plus, giving hay first takes the edge off the horse's hunger. Slowing a horse's feed intake reduces choke risks and encourages healthy gut functions.

"Feeding hay first means more saliva production and better stomach buffering, which means fewer issues with stomach acid and hopefully a happier horse," Coleman said. "Even in cases of horses coming in after being outside in a paddock, having hay to start the meal will help reduce eating too fast."

One misperception Thunes finds horse owners have about a forage-based diet is that forage is only for bulk and serves no other purpose than to "fill the horse up."

"That is simply not true," she said. "Horses can gain a large number of calories from fermented forage. Forages also provide many other important nutrients such as protein and minerals."

The maturity level of the forage influences the available nutrients, so it might not provide everything in the horse's diet. But it is the place to start when building a feeding plan for a horse. Here's what you need to know about designing a forage-first diet.

Forage-First Diets

A quality forage source should make up at least 50% of the horse's daily diet. Alternatively, in a forage-first diet horses ideally should eat at least 1.5% of their body weight per day as forage,

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Legume hays are higher in protein, so they will provide more calories per pound, and are higher in calcium, making them good at buffering stomach acid.

said Thunes. That equates to about 18 pounds of forage for a 1,200-pound horse. Ideally, they have access to more.

Hay is often equated with a forage-first ration, but a forage diet also includes pasture. The nutritional value of forage varies geographically and by the forage type, which also factors into the forage volume a horse needs.

"In northern climates, pasture grasses are typically cold-season varieties such as rye species, bluegrass or orchard grass, perhaps with some clover mixed in," noted Thunes. "In more southern climates, warm-season varieties such as Bahia Grass and Bermuda Grass will be more common. Legumes like alfalfa and peanut hay are common in horse diets."

Generally, grass hays tend to be lower in calories, but sugars can be high. Protein levels are higher in legume hays, but Thunes said it is impossible to make a blanket statement that applies to all hay types. Growing conditions more than forage species influence the amount of non-structural carbohydrates (NSC).

"The legume hays are considerably higher in protein as they are nitrogen fixers," said Thunes. "Therefore, they will typically have higher calcium contents and provide more calories per pound. The higher calcium and protein make them good at buffering stomach acid, so they can be useful in horses prone to gastric ulcers. But the higher calorie content makes them a challenge for easier keepers."

When Thunes suggests that clients feed legume hay, she limits the ration to 25-30% of the total forage intake, with the balance coming from grass hays.

Evaluating Forage Quality

Helping your clients evaluate hay quality is essential in designing a forage-first diet. Quality is typically judged based on smell, feel and visual appearance. Generally, hay should be fine-stemmed, green and leafy.

"It should have a sweet smell and be free of any mold," said Sue Arnold, executive director of the National Hay Association. "Avoid hay that is excessively bleached or discolored or smells musty, dusty or fermented."

Arnold offers these tips for visually evaluating hay:

Color: Ideally, it should be good green color. Hay that is beige in hue indicates that it has been sun bleached or subjected to rain, while dark brown hay might point to heat damage.

Maturity: Hay cut at a later stage of maturity is less digestible and has less crude protein than hay cut earlier. It will also be coarser and have more seed heads. Ideally, hay will feel soft to the touch, as it should have fine stems and lots of leaves.

Free of dust and mold: Mold is often found as clumps in the middle of the hay. Banging two flakes of hay together is an excellent way to see how much dust is present.

Free of weeds, pests and foreign materials: A good look at several hay bales is the best way to ensure it does not contain excessive weeds (some weeds are inevitable). Hay should also be free of pests—such as blister beetles—and foreign material such as garbage.

"A visual inspection cannot determine the nutrient content of a hay, but the appearance can be an indication of overall quality," Arnold said.

Defining quality forage is always a challenge, Coleman said. It requires taking samples from about 20 bales and sending the samples to a lab for analysis. That analysis provides a clearer picture of what nutrients are available, which ones are missing and when supplementation might be necessary.

A basic nutrient analysis should include:

- digestible energy (DE)
- crude protein (CP)
- dry matter (DM)
- calcium (Ca)
- phosphorus (P)
- potassium (K)
- acid detergent fiber (ADF)
- neutral detergent fiber (NDF)

"The horse I am feeding hay to must also be considered," Coleman said. "A slightly overweight horse that eats everything might be better off with something a little lower in digestible nutrients to help with weight."

On an analysis, Coleman first looks at the hay's moisture or dry matter level. He prefers moisture levels no higher than 16.5% or dry matter equivalent to 83.5% or higher.

"Moisture levels above 16.5% have a greater risk of mold formation during storage unless the hay has been treated with a preservative," he said.

Getting a nutrient analysis is ideal, but if a client buys hay by the month, it might not be practical as the hay might come from different fields and been grown under varying conditions.

Finding (and Stretching) Forage Supplies

Sourcing hay is becoming more challenging. According to Arnold, initial indications are that U.S. acreage devoted to dry hay production in 2022 could be the lowest in 115 years. U.S. producers intend to harvest 50.3 million acres of all hay in 2022, down 1% from 2021.

"If realized, this will represent the lowest total hay harvested area since 1907," stated Arnold. "Oklahoma, Texas and Tennessee are expected to see the largest drop in dry hay acreage. There is forage available this year. And while prices per ton have increased, a major impact seems to be the transportation costs and logistic challenges. So overall, prices are up from 2021."

High-fiber hay extender feeds can be used to replace all or some of the hay in a horse's diet. However, attention should be paid to whether these pellets are fortified, as this can impact whether they can be fed with other fortified commercial feeds.

"Some hay extenders are complete, meaning [they have] added minerals and vitamins and, if combined with other fortified feeds, could result in an excess intake of some nutrients, especially minerals," Thunes said.

Nutritionally, alfalfa pellets and cubes may provide the same essential nutrients per pound, according to Arnold. However, alfalfa cubes are more appropriate for lactating mares or growing horses and as a partial forage substitute. While up to 15 pounds or more can be fed daily, as little as two to six pounds of cubes per day can be used as a "hay extender" if only poor-quality hay is available.

"Forage cubes or pellets can be fed just like hay at a 1:1 ratio of the hay type the horse currently consumes," Thunes said. "For example, you would replace five pounds of alfalfa hay with five pounds of alfalfa cubes and adjust the amount if needed to maintain the animal's proper weight. These pellets can be used if forage is in short supply. With processed products, horse owners can easily weigh the material and know how much they feed."



COURTESY ADM

Pelleted forage extenders and feeds that contain a high percentage of forage are very useful as hay supplements or replacements.

The Bottom Line

Vets should help their clients understand that the majority of a horse's diet should consist of forage. This supports the horse's natural digestive anatomy, which is designed to ferment grasses and hays. Forage-first diets also encourage saliva production, which in turn acts as a buffering agent in the stomach to help reduce gastric upset or even ulcers.

"There are commercial feeds that are called forage-first and generally are a higher-fiber feed," said Coleman. "More fiber means more chewing, which means more saliva production, which means better stomach buffering. More stomach buffering means less gastric issues and hopefully a happier horse." EM



Different equine veterinary associate candidates will have different desires for their ideal positions.

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Create a Position That Can Attract an Associate

Creating an associate position that will attract candidates is challenging, and it might require changes in the practice.

By Amy L. Grice, VMD, MBA

All over the world, practices are struggling to hire equine veterinarians. In the U.S. in 2021, 1.4% (46) of new graduates accepted equine positions as associates directly after graduation, and an additional 3% (96) entered equine internships. These numbers are far lower than those of just 10 years ago.

Equine medicine is not alone in this struggle. The AVMA reported at the 2021 Economic Summit that there were 16.8 job openings per veterinarian jobseeker across the country at that time. Most of those positions were for companion animal doctors. Because work hours are lower, with little to no emergency work required and much higher compensation, many new graduates are attracted to small animal or mixed practices.

Average debt in 2021 among the 83% of graduates with loans was $188,000, leaving many feeling compelled to take higher-paying positions in small animal medicine to meet their financial obligations, even if they had originally intended to work with horses.

In this tough environment, equine practices are competing with each other and with companion animal practices for associates. Many receive no applicants even after multiple months or years of searching. In fact, AVMA data showed that about 50% of states have fewer than one applicant per job opening. This can be a daunting struggle, especially for practices that have lost doctors and with

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The type of position that is attractive to Millennials might be based on geography and mentoring opportunities.

a caseload predicated on a certain number of practitioners. With the workload increase for the remaining veterinarians, the risk of further attrition grows even stronger.

What Attracts Associates?

Attracting an associate in 2022 has many elements. Successful hires often are veterinarians who want to return to their hometown areas or at least to their home states. Often these are women who plan to have children and desire to be near extended family. Location for these doctors is one of their top priorities.

Geography is also important when a spouse has a career that must be accommodated. By identifying students interested in veterinary medicine in your region, you might be able to establish a relationship and offer mentoring and shadowing prior to their application to vet school. Participating in career fairs and speaking about your profession at local 4-H or Pony Club groups can stimulate interest in a life as a horse doctor. If these young people become veterinary students or graduates, you might become a source of externship opportunities or an employer. Many of today's successful associate hires have come from this type of long-term nurturing.

The type of position that is attractive to Millennials is one where their desires to have a life outside of work is acknowledged. A four-day work week is increasingly common. A survey in May 2022 revealed that 25.3% of respondents' practices saw routine elective appointments only four days a week during their busy season, and 37.3% saw routine elective appointments only four days a week in their slower season. Many of these doctors work four 10-hour days a week and earn similar amounts of revenue to that which they previously earned working five days. Being better rested and having time for personal pursuits seems to increase productivity for these veterinarians.

Millennials as a group also cherish communication and leadership that is collaborative and transparent. They value mentoring but dislike being micro-managed. They expect that their ideas will be considered and sometimes implemented. Making a positive difference in the world is important to them, so practices that seem overly focused on making money rather than helping horses will disappoint them. Educating these doctors about the connection between revenue production, healthy profit, high compensation and a strong business can help their job satisfaction.

Emergency Duty

Most equine veterinarians that leave the equine sector do so because of long hours and lifestyle, emergency duty requirements, mental health and low compensation, according to a study reported at the 2020 AAEP Annual Convention. Associates seek an equitably shared on-call burden and one that minimizes their emergency duty responsibilities. One weekend every four to six weeks and one weeknight each week or less are often the maximum that will attract a candidate. For the majority of practices, this means forming or joining an emergency cooperative or no longer providing these services.

Unfortunately, seeing enough emergencies in early years of practice to become more confident of one's abilities is necessary, or permanent emergency duty anxiety can set in. Even young associates who have finished an internship might not have experienced independent emergency duty and might not feel ready to exercise their knowledge.

There is no replacement for experience in teaching a doctor about his or her own competency and abilities. As emergency duty becomes less frequent, there is a strong possibility that young doctors will not bridge that critical confidence gap. In lieu of those formative experiences, post-graduate education in emergency case management might be more necessary in a continuing education setting. In some horse-intensive areas, emergency-only practices might fill the gaps.

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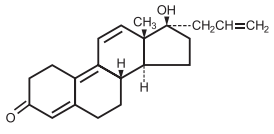
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ACTIONS:
Altren® (altrenogest) Solution 0.22% produces a progestational effect in mares.

INDICATIONS:
Altren® (altrenogest) Solution 0.22% is indicated to suppress estrus in mares. Suppression of estrus allows for a predictable occurrence of estrus following drug withdrawal. This facilitates the attainment of regular cyclicity during the transition from winter anestrus to the physiological breeding season. Suppression of estrus will also facilitate management of prolonged estrus conditions. Suppression of estrus may be used to facilitate scheduled breeding during the physiological breeding season.

CONTRAINDICATIONS:
Altren® (altrenogest) Solution 0.22% is contraindicated for use in mares having a previous or current history of uterine inflammation (i.e., acute, subacute, or chronic endometritis). Natural or synthetic gestagen therapy may exacerbate existing low-grade or "smoldering" uterine inflammation into a fulminating uterine infection in some instances.

PRECAUTIONS:
Various synthetic progestins, including altrenogest, when administered to rats during the embryogenic stage of pregnancy at doses manyfold greater than the recommended equine dose caused fetal anomalies, specifically masculinization of the female genitalia.

DOSAGE AND DIRECTIONS:
While wearing protective gloves, remove shipping cap and seal; replace with enclosed plastic dispensing cap. Remove cover from bottle dispensing tip and connect luer lock syringe (without needle). Draw out appropriate volume of Altren® solution. (Note: Do not remove syringe while bottle is inverted as spillage may result.) Detach syringe and administer solution orally at the rate of 1 mL per 110 pounds of body weight (0.044 mg/kg) once daily for 15 consecutive days. Administer solution directly on the base of the mare's tongue or on the mare's usual grain ration. Replace cover on bottle dispensing tip to prevent leakage. Excessive use of a syringe may cause the syringe to stick; therefore, replace syringe as necessary.

DOSAGE CHART:

Approximate Weight in Pounds	Dose in mL
770	7
880	8
990	9
1100	10
1210	11
1320	12

WHICH MARES WILL RESPOND TO ALTREN® (altrenogest) SOLUTION 0.22%:
Extensive clinical trials have demonstrated that estrus will be suppressed in approximately 95% of the mares within three days; however, the post-treatment response depended on the level of ovarian activity when treatment was initiated. Estrus in mares exhibiting regular estrus cycles during the breeding season will be suppressed during treatment; these mares return to estrus four to five days following treatment and continue to cycle normally. Mares in winter anestrus with small follicles continued in anestrus and failed to exhibit normal estrus following withdrawal.

Response in mares in the transition phase between winter anestrus and the summer breeding season depended on the degree of follicular activity. Mares with inactive ovaries and small follicles failed to respond with normal cycles post-treatment, whereas a higher proportion of mares with ovarian follicles 20 mm or greater in diameter exhibited normal estrus cycles post-treatment. Altrenogest Solution 0.22% was very effective for suppressing the prolonged estrus behavior frequently observed in mares during the transition period (February, March and April). In addition, a high proportion of these mares responded with regular estrus cycles post-treatment.

SPECIFIC USES FOR ALTREN® (altrenogest) SOLUTION 0.22%:

SUPPRESSION OF ESTRUS TO:
1. Facilitate attainment of regular cycles during the transition period from winter anestrus to the physiological breeding season. To facilitate attainment of regular cycles during the transition phase, mares should be examined to determine the degree of ovarian activity. Estrus in mares with inactive ovaries (no follicles greater than 20 mm in diameter) will be suppressed but these mares may not begin regular cycles following treatment. However, mares with active ovaries (follicles greater than 20 mm in diameter) frequently respond with regular post-treatment estrus cycles.

2. Facilitate management of the mare exhibiting prolonged estrus during the transition period. Estrus will be suppressed in mares exhibiting prolonged behavioral estrus either early or late during the transition period. Again, the post-treatment response depends on the level of ovarian activity. The mares with greater ovarian activity initiate regular cycles and conceive sooner than the inactive mares. Altren® (altrenogest) Solution 0.22% may be administered early in the transition period to suppress estrus in mares with inactive ovaries to aid in the management of these mares or to mares later in the transition period with active ovaries to prepare and schedule the mare for breeding.

3. Permit scheduled breeding of mares during the physiological breeding season. To permit scheduled breeding, mares which are regularly cycling or which have active ovarian function should be given Altren® (altrenogest) Solution 0.22% daily for 15 consecutive days beginning 20 days before the date of the planned estrus. Ovulation will occur 5 to 7 days following the onset of estrus as expected for non-treated mares. Breeding should follow usual procedures for mares in estrus. Mares may be regulated and scheduled either individually or in groups.

ADDITIONAL INFORMATION:
A 3-year well controlled reproductive safety study was conducted in 27 pregnant mares, and compared with 24 untreated control mares. Treated mares received 2 mL altrenogest solution 0.22%/110 lb body weight (2x dosage recommended for estrus suppression) from day 20 to day 325 of gestation. This study provided the following data:

1. In filly offspring (all ages) of treated mares, clitoral size was increased.

2. Filly offspring from treated mares had shorter interval from Feb. 1 to first ovulation than fillies from their untreated mare counterparts.

3. There were no significant differences in reproductive performance between treated and untreated animals (mares & their respective offspring) measuring the following parameters:

   - interval from Feb. 1 to first ovulation, in mares only.
   - mean interovulatory interval from first to second cycle and second to third cycle, mares only.
   - follicle size, mares only.
   - at 50 days gestation, pregnancy rate in treated mares was 81.8% (9/11) and untreated mares was 100% (4/4).
   - after 3 cycles, 11/12 treated mares were pregnant (91.7%) and 4/4 untreated mares were pregnant (100%).
   - colt offspring of treated and control mares reached puberty at approximately the same age (82 & 84 weeks respectively).
   - stallion offspring from treated and control mares showed no differences in seminal volume, spermatozoal concentration, spermatozoal motility, and total sperm per ejaculate.
   - stallion offspring from treated and control mares showed no difference in sexual behavior.
   - testicular characteristics (scrotal width, testis weight, parenchymal weight, epididymal weight and height, testicular height, width & length) were the same between stallion offspring of treated and control mares.

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WARNING:
For oral use in horses only. Keep this and all other medications out of the reach of children. Do not use in horses intended for human consumption.

HUMAN WARNINGS:
Skin contact must be avoided as Altren® (altrenogest) Solution 0.22% is readily absorbed through unbroken skin. Protective gloves must be worn by all persons handling this product. Pregnant women or women who suspect they are pregnant should not handle Altren® (altrenogest) Solution 0.22%. Women of child bearing age should exercise extreme caution when handling this product. Accidental absorption could lead to a disruption of the menstrual cycle or prolongation of pregnancy. Direct contact with the skin should therefore be avoided. Accidental spillage on the skin should be washed off immediately with soap and water.

INFORMATION FOR HANDLERS:
WARNING: Altren® (altrenogest) Solution 0.22% is readily absorbed by the skin. Skin contact must be avoided; protective gloves must be worn when handling this product.

Effects of Overexposure
There has been no human use of this specific product. The information contained in this section is extrapolated from data available on other products of the same pharmacological class that have been used in humans. Effects anticipated are due to the progestational activity of altrenogest.

Acute effects after a single exposure are possible; however, continued daily exposure has the potential for more untoward effects such as disruption of the menstrual cycle, uterine or abdominal cramping, increased or decreased uterine bleeding, prolongation of pregnancy and headaches. The oil base may also cause complications if swallowed.

In addition, the list of people who should not handle this product (see below) is based upon the known effects of progestins used in humans on a chronic basis.

PEOPLE WHO SHOULD NOT HANDLE THIS PRODUCT:
1. Women who are or suspect they are pregnant.
2. Anyone with thrombophlebitis or thromboembolic disorders or with a history of these events.
3. Anyone with cerebral-vascular or coronary-artery disease.
4. Women with known or suspected carcinoma of the breast.
5. People with known or suspected estrogen-dependent neoplasia.
6. Women with undiagnosed vaginal bleeding.
7. People with benign or malignant tumors which developed during the use of oral contraceptives or other estrogen-containing products.
8. Anyone with liver dysfunction or disease.

Accidental Exposure
Altrenogest is readily absorbed from contact with the skin. In addition, this oil based product can penetrate porous gloves. Altrenogest should not penetrate intact rubber or impervious gloves; however, if there is leakage (i.e., pinhole, spillage, etc.), the contaminated area covered by such occlusive materials may have increased absorption. The following measures are recommended in case of accidental exposure.

Skin Exposure: Wash immediately with soap and water.

Eye Exposure: Immediately flush with plenty of water for 15 minutes. Get medical attention.

If Swallowed: Do not induce vomiting. Altren® (altrenogest) Solution 0.22% contains an oil. Call a physician. Vomiting should be supervised by a physician because of possible pulmonary damage via aspiration of the oil base. If possible, bring the container and labeling to the physician.

Store upright at or below 25° C (77° F). Reclose tightly.

HOW SUPPLIED:
Altren® (altrenogest) Solution 0.22% (2.2 mg/mL). Each mL contains 2.2 mg altrenogest in an oil solution. Available in 150 mL and 1000 mL plastic bottles.

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graduates are women in their child-bearing years, associate positions need to be family friendly. Employers need to talk about how previous maternity leaves were handled or have a plan for handling them. Exhibiting flexibility is a key component, as pregnancy and delivery are quite variable.

Once children are on the scene, flexibility remains important because of unexpected child-care issues, illness and other demands. Having a hard stop on non-emergency duty days helps parents meet their obligations for pick-ups of children as well as fostering time to actually be together as a family. Owners of practices that are most successful in hiring are often those who have children themselves and "walk their talk" by making their families their priority in visible ways.

Money Still Matters

Companion animal business models are highly efficient compared to the equine veterinary industry. Expecting associates to earn sufficient production to support higher salaries will require fees to rise. Encouraging haul-in appointments to minimize the time and expense of ambulatory calls can be helpful if the facility is modest and used to capacity. Providing technical staff can also increase efficiency and boost earnings.

Practices that can offer these options will typically get more applicants.

A recent survey showed that about two-thirds of associates prefer to be compensated with a base salary plus a production bonus, but only 38.6% were receiving that type of renumeration. Payment of emergency fees was reported by 72.0%, with 28.0% receiving no additional pay.

Most candidates now expect 100% of emergency fees to be paid for emergencies they attend in order to consider accepting a position. Base salaries for positions that are filled are rarely

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It's been a great deal for us and for the client."

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There is no sense in hiring an associate who moves on within a year or two because he or she wants to practice with a different type of clientele.

less than $75,000, and on the coasts base salaries of $85,000 are more typical.

Benefits

Benefits that matter to candidates include student loan repayment plans that are non-taxable, meaningful amounts of time away from the practice, the opportunity to engage in skill-building continuing education, and a clear path to ownership should they desire it. Licenses, memberships in state and national veterinary associations, and professional liability insurance paid by the practice are expected.

Culture

Although it is hard to represent a practice's culture in a job ad, practices that are successful at hiring are able to paint an accurate picture of what the practice's team cares about and why the practice exists. An applicant needs to get a feel for the values and priorities of the practice, and whether those values and priorities resonate with the candidate's values and priorities.

In the past, many job ads used the words "work ethic," "hard-working" or "team player" to signal that only hard-driving, work-centered applicants belonged.

It's a new world.

The words that attract now include "team-centered," "collaborative," "flexible" and "supportive." Potential associates are seeking environments where the well-being of the team trumps client demands and maximizing earnings. In other words, "people before profit."

Lifestyle and Environment

Because Millennials are, as a rule, environmentally conscious and enjoy spending time outside, sometimes the allure of the surroundings of a practice will matter as a deciding factor between two jobs. When writing your job ad, accentuate the natural world features that are most positive, as well as mentioning family-friendly attractions such as highly regarded school systems or low-crime, country settings.

Describing what life is like in your town or county is better than a laundry list of the diagnostic equipment that has become a baseline expectation for any practice worthy of being considered.

Also, a description of your client and patient population is critical for attracting a candidate who wants what you have. There is no sense in hiring an associate who moves on within a year or two because he or she wants to practice with a different type of clientele.

Take-Home Message

Every candidate will have different desires for their ideal positions. Be flexible and understand that they are often more focused on interviewing you and the practice than you are on interviewing them. But do ask about what they want to achieve professionally in the next five years, and what they desire their life to look like in 10 years. Ask whether they can see themselves attaining their goals at your practice, and why.

If they ask about mentoring, be honest. If you are not temperamentally suited to the patient and often time-consuming process of teaching, don't raise false hopes, but offer to arrange opportunities for learning in a different setting or with a different mentor.

Be ready to talk about your priorities for your work and life, and discuss what is most important to you. A candidate whose children or life outside of work are first—and profession is second—will rarely accept a job where the owner models a different way and doesn't show acceptance of other perspectives. Feeling a sense of belonging and acceptance is a human need. If a veterinarian feels like his or her values and priorities don't match up with others on the team, they will not accept a job. Or if they do, they will rarely be there long-term.

In summary, creating an associate position that will attract candidates is challenging, and it is made more difficult because it can require change to the practice's culture, business model, fee structure, expectations and communication style. Embracing change is not easy, but it is the best path for engaging the newest generation of horse doctors. EM

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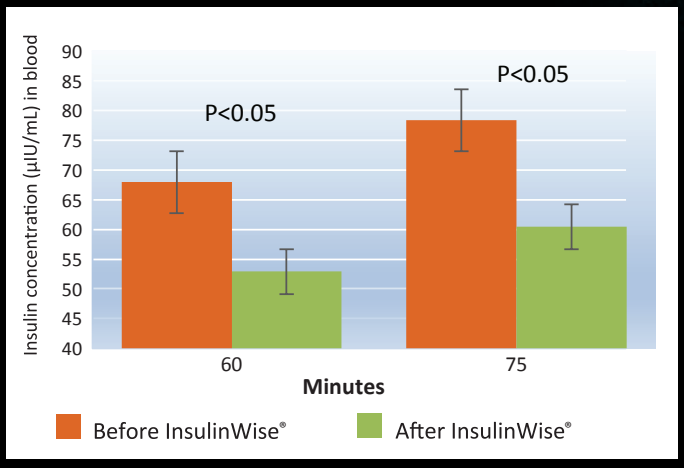


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*Manfredi JM, Stapley ED, Nash D. Effects of a dietary supplement on insulin and adipokine concentrations in equine metabolic syndrome/ insulin dysregulation. In J Equine Vet Sci 2020:88:102930.

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"It only takes one problem mare each season to feel like all you have done is 'clean up' dirty mares," said Dr. Sandy Tasse.

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Cleaning Up 'Dirty' Mares

A successful pregnancy often can be obtained in a 'dirty' mare through diagnosis of underlying issues and proper treatment.

By Stacey Oke, DVM, MSc

Chances are you successfully breed dozens of mares each spring. "It only takes one problem mare each season to feel like all you've done is clean up 'dirty' mares," commented Sandy Tasse, DVM, an ambulatory veterinarian at Rood & Riddle Equine Hospital in Saratoga, New York. On average, she breeds 30-40 horses each season and says only about 10%–20% are "dirty" and require extra effort to get bred. Sometimes, regardless of the work, the mare won't conceive or hold the pregnancy.

Tasse recently had a maiden mare that was about 7 years old, theoretically an "ideal" candidate. But the mare retained a large volume of fluid in her uterus before breeding was even attempted.

"We tried lavaging, antibiotics, oxytocin and manual dilation of her cervix to get the fluid out of there, and it just always comes back," Tasse said. "So, it was a lost cause. If you can't get rid of the fluid, and it is present when the embryo comes down, it's like the embryo

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Cleaning up mares might require culture and lavage to ensure the mare can carry a pregnancy.

is jumping into a swimming pool; it's going to die."

In cases like these, sometimes you have to call it quits. But for many "dirty" mares, a successful pregnancy is possible when you are aware of client goals, know the underlying issue(s), and follow strict hygiene practices any time you enter the cervix for culture, lavage or insemination.

Understand Client Goals and Budget

Horse owners breed for a myriad of reasons. It sounds basic, but knowing the purpose behind the breeding is essential in determining the time and finances they can invest in getting a mare bred.

"Ask the client about their goals," said Tasse. "Find out if they have a budget cap and what they might be willing to try or invest in."

Tasse suggested finding out whether the mare will be bred live cover or with cooled or frozen semen. Artificial insemination might increase the chances of creating a "dirty mare" in certain cases.

"Some mares are more reactive to cooled semen," she said. "The extender used to keep the semen alive until insemination is the perfect medium for bacteria to grow because it is the feeder system for the sperm."

Tasse experienced this with an older maiden mare. Theoretically, the horse should have been clean. Admittedly, 16 years old was not the ideal time to breed a maiden mare, but she had no signs indicating that she could not conceive or carry a foal.

Tasse inseminated the mare with cooled shipped semen, found no signs of excessive inflammation or fluid at the ovulation check, but found a uterus full of fluids rather than an embryo at the two-week ultrasound for pregnancy.

One challenge: The mare's cervix was barely opening on its own, and Tasse believed that played a part prevented the fluids from exiting post-breeding.

Tasse said a culture revealed pseudomonas, and the mare was lavaged and treated with antibiotics. It was close to mid-summer, so they elected to stop efforts until the following year. The mare was cultured in advance of the subsequent breeding, and there were no sign of fluid or bacteria. It took three cycles, but the mare got pregnant and had no issues that year.

"We were more aggressive with dilating her cervix, and I think that helped," Tasse said. "This can be a common problem with breeding older maiden mares. Their cervix may not dilate normally when in estrus, and their uterus may not have effective enough contractions to expel the fluid post breeding."

Breeding with cooled or frozen semen can require more maintenance post breeding, such as a lavage or antibiotics, thus increasing the cost per breeding cycle.

Bacteria Causing 'Dirty' Mares

Mares that experience chronic uterine infections can develop scar tissue and

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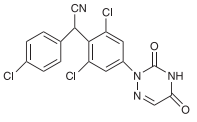
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PROTAZIL®
(1.56% diclazuril)
Antiprotozoal Pellets

FOR ORAL USE IN HORSES ONLY

CAUTION
Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian.
NADA #141-268 Approved by FDA

DESCRIPTION
Diclazuril, (±)-2,6-dichloro-α-(4-chlorophenyl)-4-(4,5-dihydro-3,5-dioxo-1,2,4-triazin-2(3H)-yl)benzeneacetonitrile, has a molecular formula of $C_{17}H_9Cl_3N_4O_2$, a molecular weight of 407.64, and a molecular structure as follows:



Diclazuril is an anticoccidial (antiprotozoal) compound with activity against several genera of the phylum Apicomplexa. PROTAZIL® (diclazuril) is supplied as oral pellets containing 1.56% diclazuril to be mixed as a top-dress in feed. Inert ingredients include dehydrated alfalfa meal, wheat middlings, cane molasses and propionic acid (preservative).

INDICATIONS
PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets are indicated for the treatment of equine protozoal myeloencephalitis (EPM) caused by *Sarcocystis neurona* in horses.

DOSAGE AND ADMINISTRATION
Dosage: PROTAZIL® (1.56% diclazuril) is administered as a top dress in the horse's daily grain ration at a rate of 1 mg diclazuril per kg (0.45 mg diclazuril/lb) of body weight for 28 days. The quantity of PROTAZIL® necessary to deliver this dose is 64 mg pellets per kg (29 mg pellets/lb) of body weight.

Administration: To achieve this dose, weigh the horse (or use a weigh tape)). Scoop up PROTAZIL® to the level (cup mark) corresponding to the dose for the horse's body weight using the following chart:

Weight Range of Horse (lb)	mLs of Pellets	Weight Range of Horse (lb)	mLs of Pellets
275 - 524	20	1275 - 1524	60
525 - 774	30	1525 - 1774	70
775 - 1024	40	1775 - 2074	80
1025 - 1274	50	-	-

One 2.4-lb bucket of PROTAZIL® will treat one 1274-lb horse for 28 days. One 10-lb bucket of PROTAZIL® will treat five 1100-lb horses for 28 days.

CONTRAINDICATIONS
Use of PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets is contraindicated in horses with known hypersensitivity to diclazuril.

WARNINGS
For use in horses only. Do not use in horses intended for human consumption. Not for human use. Keep out of reach of children.

PRECAUTIONS
The safe use of PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets in horses used for breeding purposes, during pregnancy, or in lactating mares has not been evaluated. The safety of PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets with concomitant therapies in horses has not been evaluated.

ADVERSE REACTIONS
There were no adverse effects noted in the field study which could be ascribed to diclazuril. To report suspected adverse reactions, to obtain a MSDS, or for technical assistance call **1-800-224-5318**.

CLINICAL PHARMACOLOGY
The effectiveness of diclazuril in inhibiting merozoite production of *Sarcocystis neurona* and *S. falcatula* in bovine turbinate cell cultures was studied by Lindsay and Dubey (2000).[1] Diclazuril inhibited merozoite production by more than 80% in cultures of *S. neurona* or *S. falcatula* treated with 0.1 ng/mL diclazuril and greater than 95% inhibition of merozoite production (IC_{50}) was observed when infected cultures were treated with 1.0 ng/mL diclazuril. The clinical relevance of the in vitro cell culture data has not been determined.

PHARMACOKINETICS IN THE HORSE
The oral bioavailability of diclazuril from the PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets at a 5 mg/kg dose rate is approximately 5%. Related diclazuril concentrations in the cerebrospinal fluid (CSF) range between 1% and 5% of the concentrations observed in the plasma. Nevertheless, based upon equine pilot study data, CSF concentrations are expected to substantially exceed the in vitro IC_{50} estimates for merozoite production (Dirikolu et al., 1999)[2]. Due to its long terminal elimination half-life in horses (approximately 43-65 hours), diclazuril accumulation occurs with once-daily dosing. Corresponding steady state blood levels are achieved by approximately Day 10 of administration.

EFFECTIVENESS
Two hundred and fourteen mares, stallions, and geldings of various breeds, ranging in age from 9.6 months to 30 years, were enrolled in a multi-center field study. All horses were confirmed EPM-positive based on the results of clinical examinations and laboratory testing, including CSF Western Blot analyses. Horses were administered PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets at doses of 1, 5, or 10 mg diclazuril/kg body weight as a top-dress on their daily grain ration for 28 days. The horses were then evaluated for clinical changes via a modified Mayhew neurological scale on Day 48 as follows:

0. Normal, neurological deficits not detected.
1. Neurological deficits may be detectable at normal gaits; signs exacerbated with manipulative procedures (e.g., backing, turning in tight circles, walking with head elevation, truncal swaying, etc.).
2. Neurological deficit obvious at normal gaits or posture; signs exacerbated with manipulative procedures.
3. Neurological deficit very prominent at normal gaits: horses give the impression they may fall (but do not) and buckle or fall with manipulative procedures.
4. Neurological deficit is profound at normal gait: horse frequently stumbles or trips and may fall at normal gaits or when manipulative procedures were utilized.
5. Horse is recumbent, unable to rise.

Each horse's response to treatment was compared to its pre-treatment values. Successful response to treatment was defined as clinical improvement of at least one grade by Day 48 ± conversion of CSF to Western Blot-negative status for *S. neurona* or achievement of Western Blot-negative CSF status without improvement of 1 ataxia grade.

Forty-two horses were initially evaluated for effectiveness and 214 horses were evaluated for safety. Clinical condition was evaluated by the clinical investigator's subjective scoring and then corroborated by evaluation of the neurological examination videotapes by a masked panel of three equine veterinarians. Although 42 horses were evaluated for clinical effectiveness, corroboration of clinical effectiveness via videotape evaluation was not possible for one horse due to missing neurologic examination videotapes. Therefore, this horse was not included in the success rate calculation. Based on the numbers of horses that seroconverted to negative Western Blot status, and the numbers of horses classified as successes by the clinical investigators, 28 of 42 horses (67%) at 1 mg/kg were considered successes. With regard to independent expert masked videotape assessments, 10 of 24 horses (42%) at 1 mg/kg were considered successes. There was no clinical difference in effectiveness among the 1, 5, and 10 mg/kg treatment group results. Adverse events were reported for two of the 214 horses evaluated for safety. In the first case, a horse was enrolled showing severe neurologic signs. Within 24 hours of dosing, the horse was recumbent, biting, and exhibiting signs of dementia. The horse died, and no cause of death was determined. In the second case, the horse began walking stiffly approximately 13 days after the start of dosing. The referring veterinarian reported that the horse had been fed grass clippings and possibly had laminitis.

ANIMAL SAFETY
PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets were administered to 30 horses (15 males and 15 females, ranging from 5 to 9 months of age) in a target animal safety study. Five groups of 6 horses each (3 males and 3 females) received 0, 5 (5X), 15 (15X), 25 (25X) or 50 (50X) mg diclazuril/kg (2.27mg/lb) body weight/day for 42 consecutive days as a top-dress on the grain ration of the horse. The variables measured during the study included: clinical and physical observations, body weights, food and water consumption, hematology, serum chemistry, urinalysis, fecal analysis, necropsy, organ weights, gross and histopathologic examinations. The safety of diclazuril top-dress administered to horses at 1 mg/kg once daily cannot be determined based solely on this study because of the lack of an adequate control group (control horses tested positive for the test drug in plasma and CSF). However, possible findings associated with the drug were limited to elevations in BUN, creatinine, and SDH and less than anticipated weight gain. Definitive test article-related effects were decreased grain/top-dress consumption in horses in the 50 mg/kg group. In a second target animal safety study, PROTAZIL® (1.56% diclazuril) Antiprotozoal Pellets were administered to 24 horses (12 males and 12 females, ranging from 2 to 8 years of age). Three groups of 4 horses/sex/group received 0, 1, or 5 mg diclazuril/kg body weight/day for 42 days as a top-dress on the grain ration of the horse. The variables measured during the study included physical examinations, body weights, food and water consumption, hematology, and serum chemistry. There were no test article-related findings seen during the study.

STORAGE INFORMATION
Store between 15°C to 30°C (59°F to 86°F).

HOW SUPPLIED
PROTAZIL® (1.56 % diclazuril) Antiprotozoal Pellets are supplied in 2.4-lb (1.1 kg) and 10-lb (4.5 kg) buckets.

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2. Dirikolu, L., Lehner, F., Nattrass, C., Bentz, B. G., Woods, W. E., Carter, W. E., Karpiesiuk, W. G., Jacques, J., Boyles, J., Harkins, J. D., Granstrom, D. E. and Tobin, T. 1999. Diclazuril in the horse: Its identification and detection and preliminary pharmacokinetics. *J. Vet. Pharmacol. Therap.* 22:374–379.

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Suturing the top of a mare's vulva closed (a Caslick's procedure) can help reduce reproductive tract contamination and infection.

other degenerative changes. *E. Coli*, *strep* and *pseudomonas* are bacteria that can be found in "dirty" mares. Identifying the bacteria informs the next steps the practitioner takes.

Tasse noted that *strep* is a common gram positive bacteria found in mares, but it is generally easy to treat. Gram negative bacteria can be more difficult to address. The bacteria can produce a biofilm that is like a slime encasing it, making it hard for the antibiotics to get to the bacteria to kill them. Generally, a treatment that gets rid of the biofilm—such as N-aceytylcystine, DMSO or Tris-EDTA—is used intra-uterine first, then the mare can be infused with antibiotics.

Keep in mind that a swab culture might not provide a full picture of what's going on. Even though swabs are double- and triple-guarded, there is a contamination risk. Additionally, it is a small sample from only the beginning of the uterus. Tess recommends a small-volume lavage, which uses 250 mL of fluid such as a saline or lactated ringer, to take back to the lab and spin down for a more accurate picture.

"The goal is to pick up any bacteria that might be in there, so just going into the cervix with a swab means you could miss something," she said. "The lavage is a more complete way to get a culture and hopefully not miss something, especially on a mare that has been problematic to breed."

Cytology can provide a more thorough picture of what is happening in the mare. If white blood cells are visible on the slide, it's nearly guaranteed that the mare has an infection.

Results don't rule out breeding. For example, a positive culture and positive cytology can lower the chances of pregnancy to 10%–20%. With a positive culture and negative cytology, the mare has a 40%-50% chance of breeding. A mare with a negative culture and negative cytology has the best likelihood of getting pregnant at 60%-70% if no other negative variables (such as low stallion fertility and timing of breeding is close to ovulation) are present, according to Tasse.

In some situations, a mare might be bred before a clean culture. Most live covers require a clean culture, whereas

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[1] Hunyadi L, Papich MG, Pusterla N. Pharmacokinetics of a low-dose and DA-labeled dose of diclazuril administered orally as a pelleted top dressing in adult horses. *J of Vet Pharmacology and Therapeutics* (accepted) 2014, doi: 10.111/jvp.12176. The correlation between pharmacokinetic data and clinical effectiveness is unknown

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Veterinarians need to take into consideration whether a mare will be bred live cover or with cooled or frozen semen. There are challenges that can be addressed based on breeding type.

a farm shipping cooled semen might not. Stud farms often want the culture to be taken on the same cycle as you are breeding. That means the culture must occur the first few days of estrus with results taking 24-48 hours.

On post-foaling Thoroughbred mares, some stud farms breed one to two cycles without a culture. If the mare does not conceive, then a clean culture before rebreeding is required. When a mare is bred on foal heat (nine to 12 days post foaling), it is often expected that she will not be clean.

However, the ultrasound exam should be normal, uterine involution should have occurred, and she should have a uterine lavage that looks clean even if there is not time to culture it before breeding. This helps ensure that the mare and stallion owners are not wasting their time breeding the mare if the chances of conception are low.

"It is ultimately the veterinarian's decision on if a culture is needed, even if the stud farm is not requiring one," Tasse said. "A mare should still have a normal ultrasound exam with no signs of inflammation or infection before being sent to be covered by the stallion."

Timelines can make it tricky to clean up a "dirty" mare. Sometimes, you can use a cycle when the mare is in heat and her cervix is open to clean her up. Hopefully, the next cycle she'll be clean, and you can breed her.

But some stallion farms don't breed after July 1, and there might not be time to skip a cycle. In those situations, Tasse has the mare owner order the cooled semen and begins cleaning the mare with a lavage and infused antibiotics. Then she breeds the mare and performs a post-breeding lavage.

"You have up to 48 hours after breeding to go into the uterus; then you should not go in there any more or risk interfering with the embryo, or trying to fight a closed cervix if ovulation has occurred," she said.

Conformation Contributes to 'Dirty' Mares

"Dirty" is a term used broadly to describe the infections found in mares that cycle but do not conceive. But it's essential to recognize that the conformation of the mare's reproductive organs significantly impact treatment and subsequent breeding.

"Some mares have a longer vulva, others have a shorter one, and both of those can lead to infections if the vulvar lips don't form a proper seal to keep out contaminants," Tasse said. "Older mares' rectums can be sunken in so that the vulva sticks out farther than the rectum, so the manure falls onto the vulva."

Suturing the top of the vulva closed in a Caslick's procedure can help prevent this. Mares can also suck air into through their vulva and into their vaginal vault, which also leads to contamination, so a Caslick's procedure is used to prevent mares from sucking air.

"Sometimes mares need the Caslick's stitches removed for the stallion to breed them," she said. "Problem mares may need to have the Caslick's stitches put back in right after breeding to prevent contamination."

The cervix can also influence a mare's likelihood of developing uterine infections. The cervix can be too constricted during estrus or too open during diestrus. Post-foaling and older mares that have a tilt to their uterus can pool urine in their vaginal vault. This is very irritating to the cervix, causing inflammation and contamination. Again, a Caslick's procedure can help prevent urine pooling, but if it fails to, a urethral extension surgery can be performed.

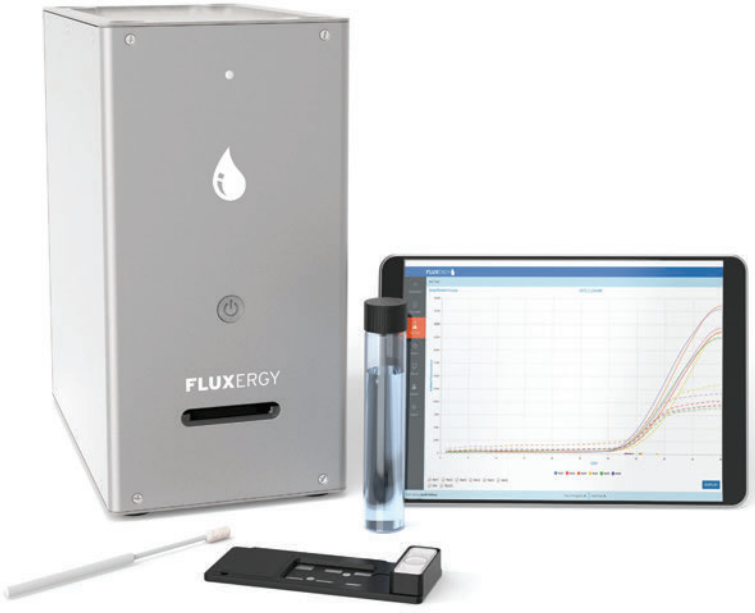
Keeping It Clean

Mother Nature and conformation can make it a challenge to clean up a "dirty" mare and to keep the uterus free from infection. Tasse stressed the importance of using multiple modalities of ultrasound findings, uterine culture and uterine cytology in order to develop a plan of action to clean up a "dirty" mare.

It is also important to take note of the conformation of the entire reproductive tract in order to best assess problems and determine the chances that the mare will get in foal. EM

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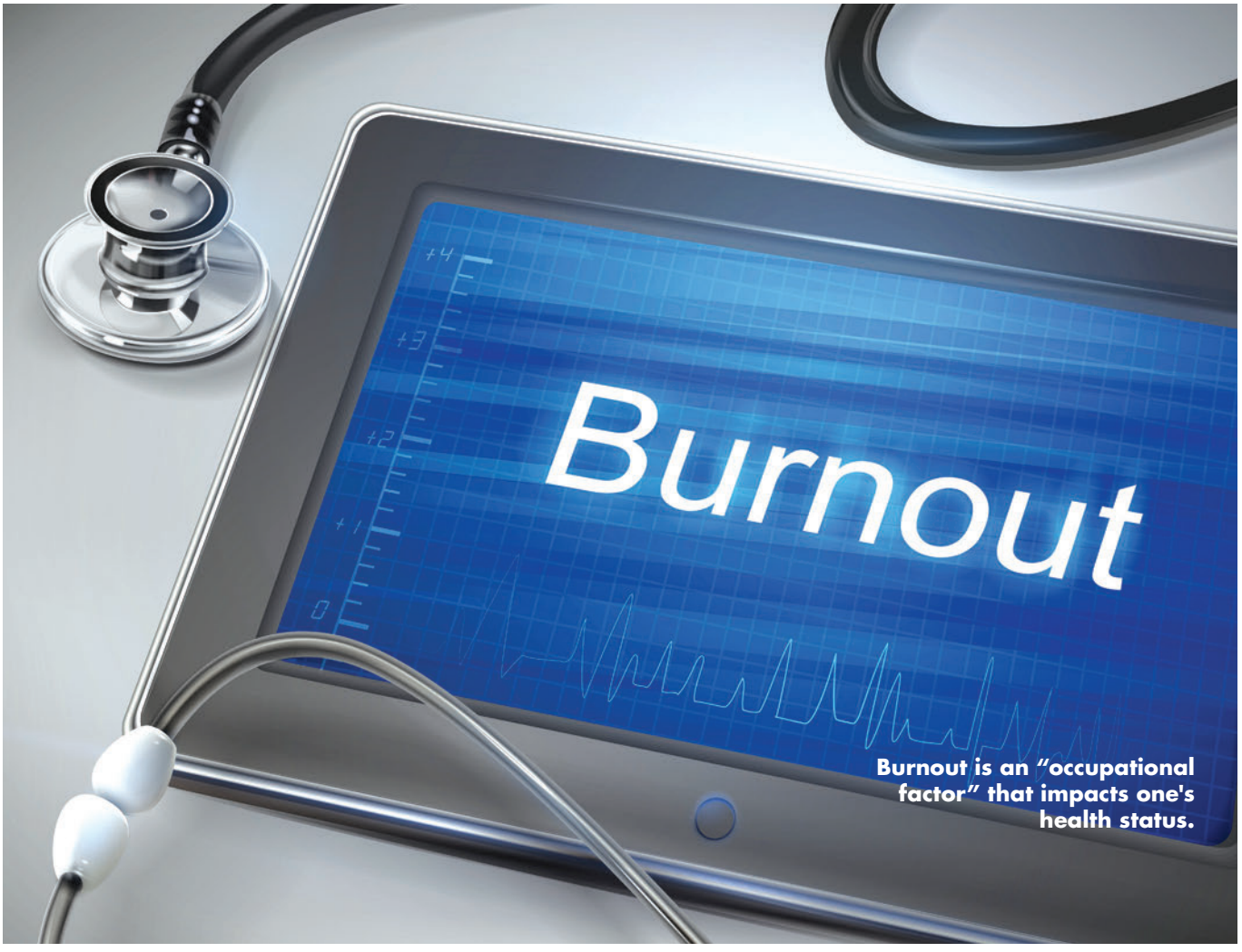
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Burnout is an "occupational factor" that impacts one's health status.

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Reclaiming What Matters: Moving Through Burnout

Burnout is not something that occurs overnight, and it can't be resolved overnight.

By Colleen Best, BScH, DVM

For veterinarians, the past few years have involved an unprecedented demand for our services. At the same time, our profession has experienced a marked shortage of veterinarians, and in many cases, support staff. The combination of these circumstances has placed incredible strain on our industry and on each of us as individuals. In turn, we are seeing profession-wide and individual consequences for these pressures and challenges, one of which is burnout.

It's important to appreciate that burnout is more than simply a descriptive term. Recently, burnout has been classified as an "occupational factor" that impacts one's health status.[1] This shift in classification is worth noting, because it delineates what might once have been viewed as something unpleasant but tolerable to something that requires more attention because, by definition, it influences our health.

It also impacts our financial bottom line, with a recent study estimating that

the financial consequence of burnout is about $150,000 per equine veterinarian due to turnover and reduced work hours.[2]

What Is Burnout?

Let's delve further into what burnout is. It was first described by Christina Maslach, and it consists of three facets in healthcare professionals—depersonalization, emotional exhaustion and feelings of low personal accomplishment.[3]

Depersonalization involves distancing oneself from those to whom care is provided; this can include failing to see or appreciate the complexities of a client and patient's unique situation. Emotional exhaustion is feeling worn out or strained with little left to give to others. Low personal accomplishment occurs when one no longer finds providing care rewarding and has a low opinion of himself or herself.



ISTOCK/JUAN MONINO

The financial consequence of burnout is about $150,000 per equine veterinarian due to turnover and reduced work hours.

We can also look at burnout from the standpoint of how our work intersects with ourselves. It can be defined as a chronic state of perceived demands exceeding perceived resources.

The word "perception" might seem to diminish the strength of this definition, but it's important to remember that perception is all we have. The inclusion of the word "perceive" in the definition draws needed attention to the fact that there is no objective measure to evaluate whether the resources are sufficient or the demands are too much—it's all in the eye of the beholder. To this end, it's important to remember that each of us is unique and responds to the demands of our work in different ways based on many factors that are often not visible to others. It is crucial to keep this front of mind and refrain from judging others based on their reaction to what we perceive their reality to be.

The impact of burnout on ourselves might be enough to motivate us to take steps to change our own resources and demands equation (i.e., do we have enough resources to meet the demands we perceive?). However, the burden and sense of responsibility we feel as caregivers to ensure that the needs of our clients and patients are met can get in the way of us putting ourselves first.

More and more research is being done in veterinary medicine to investigate the consequences of the health of the veterinarian on care provision, but we don't have firm statistics just yet. We can extrapolate from human medicine, where it's been shown that burnout results in decreased quality of care, as well as depression and problems in personal relationships, amongst others.[4-7]

There is a simple saying: "You can't pour from an empty cup." It's particularly true for caring professions. When our cups are empty, we have fewer resources (whether that be time, creativity, problem-solving, etc.) to dedicate to helping our patients and clients, never mind to use in meeting our own needs. This idea helps us find the motivation to dedicate time and energy to taking care of ourselves when it seems like doing so might have negative impacts on those we care about most—our families, friends, clients and patients.

The strategies and approaches described below can help tip the scales from demands exceeding resources to a balance or a slight advantage of resources over demands. Keep in mind that there is no magic solution; it is often small alterations made over time that ultimately lead to meaningful change and positive outcomes. Further, it is critical to realize that the systemic factors influencing our profession, and each of us has created an environment in which the barriers to self-care are incredibly high and the experience of burnout is likely more frequent than not.[2]

The strategies below are those geared toward individuals because of the nature of this article. They are not meant to diminish or dismiss the need for clinic-wide and profession-wide changes to support the well-being of veterinarians and veterinary teams.

Mindfulness

This is one of the most powerful tools we have at our disposal. This is because it can help us manage the daily barrage of inputs that is like being caught in a rainstorm of demands without any rain gear.

Mindfulness involves bringing our attention to our moment-to-moment experience in a non-judgmental fashion.


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Burnout can be defined as a chronic state of perceived demands exceeding perceived resources.

Not only does this provide us with a better understanding of what is happening, it provides us with valuable information of how we feel about our experiences and ultimately whether they are resource-providing or resource-draining. To this end, mindfulness can help us make better decisions—such as putting up an umbrella or putting on a raincoat—to help manage the constant stream of demands.

This might seem simple, but it's not easy. One of the reasons for this is because we've become acclimated to being in a rainstorm of demands and getting through our days however we can. Like fish that swim in water all the time, they often aren't aware that they're in water because it's all they know.

Practicing mindfulness can help us recognize the environment in which we find ourselves, and this can help us determine what we need to change it.

There are many ways to practice mindfulness; some of them are more intensive than others. Meditation is the best known, but it is only one of many.

Other mindfulness practices involve turning your focus inward and paying attention to your body and immediate surroundings. Doing so provides an opportunity to gather information that can help you understand how you're reacting or responding to what is around you. While not directly mindfulness practices, journaling or tracking your time and including bullet-point comments about your experience can help you better understand how you are engaging with yourself and your environment through the day.

Get To Know Yourself

In addition to understanding what resources and demands exist in our lives, we need to spend time exploring what is important to us and getting a solid vision of who we want to be. This includes understanding our purpose (our "why") and our core values.

There was a time when most of us were likely very connected to why we wanted to become veterinarians—likely in the time leading up to veterinary school. Does that "why" still resonate with you? If so, wonderful! Consider ways to connect with it on a daily basis. If not, then you might benefit from taking time to reflect on what aspects of our profession or your personal life you find fulfilling and directing energy to amplifying them.

Directing energy toward our purpose works for many because it helps keep our focus and attention on the parts of our lives that are rewarding. This helps diminish the influence of the draining or challenging aspects of our days. It can increase our feelings of career satisfaction, which will leave us feeling better about the job we've done. In turn, this contributes to feeling like we have more resources because we are meeting our own needs while doing our job.

If you want to better understand what purpose is and how it contributes to satisfaction, check out Simon Sinek's TED talk, "How great leaders inspire action."

Core values are similar to purpose, though they are more narrowly focused. They are like the equipment we travel

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Identify ways to set and assert boundaries that will slowly facilitate you being more intentional about where your resources are used.

with on a daily basis that helps us live in a way that is consistent with the person we want to be. When we are too busy to do our job or live our lives the way we want to, we add to our stress, which in turn depletes our resources and makes the demands loom larger. To this end, if we can find ways of prioritizing authenticity and honoring our values, we can increase our resources by decreasing the stress we are under on a daily basis.

In order to embrace purpose or values on a regular basis, we need to make space (or reallocate resources) in our lives to do so. We need to intentionally manage the inputs (or demands) that reach us and develop some strategies for how we handle them instead of operating on a first-come, first-served basis or a "fire-engine" approach. We can do this through boundaries. These are rules or guidelines that we set for ourselves that determine how we engage with the world. While a simple idea, they are not easy to determine, and they can be even harder to assert to others and hold for ourselves.

We want our boundaries to facilitate living in alignment with our purpose and values, as well as meeting our obligations (i.e., secure employment, mortgage, caring for our own animals). It can be helpful to take some time to consider the big picture of your life right now. How much of your time are you in charge of? Contrast this with the amount of time dictated by others. Use that information to guide you as you identify ways to set and assert boundaries that will slowly facilitate you being more intentional about where your resources are used.

Crowd-Source Resources

Finally, remember that you are not alone, and most often help is available to those who are open to receiving it. Often, when we are under high levels of stress and burnout, we feel like we are alone to deal with all the demands that come our way. This experience of isolation has been amplified by the pandemic, when access to social connection and support were limited.

Another barrier is the idea that we are all too busy to be able to provide meaningful support to one another. We can manage this by leveraging a team-based approach and embracing creative problem solving. Doing this involves open conversation about what each team member needs and finding ways for the group to support each individual. This decreases the demand on any one person, creates connection and ultimately increases resources for all.

Take-Home Message

Burnout is not something that develops overnight, and it can't be resolved that way. Changing our behavior, whether in our personal or professional lives, is difficult and requires energy and effort. It also requires choosing change at many crossroads you'll encounter on your journey.

There is no rush to start down this road and no need to pursue it at all if you're comfortable with how things are. You are always the person who is best equipped to determine what's right for you. EM

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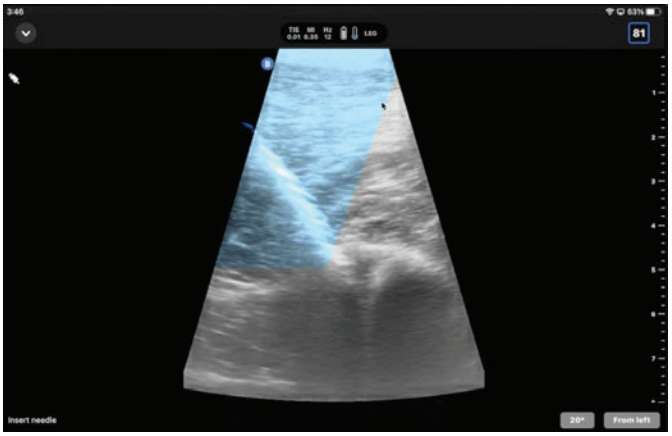
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BUTTERFLY ULTRASOUND RESOURCE LIBRARY

Butterfly Network has created an Ultrasound Resource Library on EquiManagement.com to assist equine practitioners in using ultrasound as part of their daily practice.

By Kimberly S. Brown



In a survey of equine veterinarians who read EquiManagement, the number one topic for further instruction was ultrasound. Butterfly Network teamed with Dr. Cooper Williams (see below) and EquiManagement to develop an online "Resource Library" where veterinarians can get quick and easy-to-understand ultrasound tips from a certified ISELP instructor.

In the latest in the series of articles available on EquiManagement.com, Dr. Williams talked about using sonography to help guide the placement of treatments. He said, "Ultrasound guidance thereby improves the accuracy of treatments, plus distribution of the treatment material can be observed at or in the target."

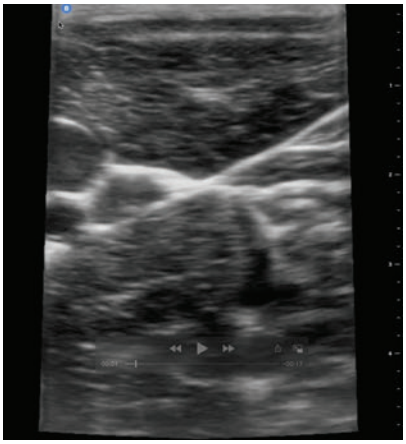
Injection of local anesthesia can also be, unfortunately, hit or miss without using ultrasound for guidance. "Ultrasound-guided local anesthesia is a prime example of the importance of accuracy. Nerve blocks and structural blocks (i.e., joints, tendon sheaths and bursas) are highly accurate with sonographic guidance, especially with deeper structures. The practitioner can avoid contact with target nerves—preventing unnecessary pain—and blood vessels—preventing excessive bleeding."

Dr. Williams will provide additional specifics for ultrasound-guided equine veterinary medical use cases in coming installments to the Resource Library.

Make sure to see the previous installments on Palmar Metacarpal Soft Tissues; Angle Contrast "ACUST" Imaging; and Dynamic Functional Ultrasound Imaging; Non-Weightbearing or Flexed Ultrasonography.

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Cooper Williams, VMD, DACVSMR, Certified ISELP Instructor, graduated in 1984 with honors from the University of Pennsylvania School of Veterinary Medicine. He accepted a post graduate internship at Delaware Equine Center, where he developed their ultrasound imaging program. In 1987, he moved to Maryland where he worked for two years at Maryland Equine Center, also developing their ultrasound program. In 1989, Williams started his own practice, focusing on diagnostics and sports medicine in equine athletes. Williams was certified by the International Society of Equine Locomotor Pathology (ISELP) in 2009 and is a certified instructor with ISELP, teaching other equine veterinarians all over the world. In 2014, Williams became a Diplomate of the American College of Veterinary Sports Medicine and Rehabilitation.

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Contagious Equine Metritis and Equine Viral Arteritis

Veterinarians can help increase owner awareness of infectious/contagious equine venereal diseases.

By Nancy S. Loving, DVM

In preparation for breeding season, it is worth having some facts on hand to protect horses against infectious venereal diseases. Two reportable diseases—contagious equine metritis (CEM) and equine viral arteritis (EVA)—can be controlled through knowledge and surveillance.

Contagious Equine Metritis (CEM)

CEM, caused by the bacteria *Taylorella equigenitalis*, is a foreign animal disease. The bacteria are surface contaminants of the genitalia. While a stallion does not experience systemic effects, a mare might present with copious vaginal discharge up to a couple of weeks following exposure, and she might not conceive on the breeding in which she was exposed. Both mare and stallion can be sources of spread. Foals can become infected during parturition.

United States outbreaks. Since 2006, there have been six outbreaks of CEM, reported Angela Pelzel-McCluskey, DVM, MS, equine epidemiologist for the USDA-APHIS-Veterinary Services. She recalled one outbreak that was massive and multi-state, lasting two years (2008-2010). More than 1,000 horses were directly exposed in 48 states. Twenty-two stallions, one gelding and five mares were found chronically infected from the outbreak and were a source of infection to other horses.

While an infected stallion does not show systemic disease, and clinical signs in a mare are usually transient, the consequences to breeding stock and the industry are significant. As an example, in the late 1970s and early 1980s, Kentucky experienced an economic disaster due to mares' failure to conceive or pregnancy loss due to CEM infection during breeding. Mares develop a copious vaginal discharge and stallions were out of commission for breeding until

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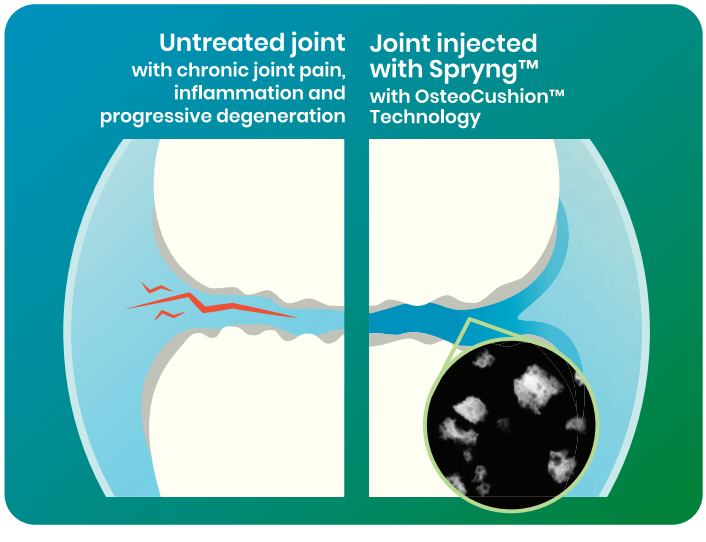
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DESCRIPTION
EQUISUL-SDT is a broad-spectrum antimicrobial from the potentiated sulfonamide class of chemotherapeutic agents. These two drugs block different sequential steps in the biosynthesis of nucleic acids. Sulfadiazine inhibits bacterial synthesis of dihydrofolic acid by competing with para-aminobenzoic acid. Trimethoprim blocks the production of tetrahydrofolic acid from dihydrofolic acid by reversibly inhibiting dihydrofolate reductase. The effect of the dual action is to reduce the minimum inhibitory concentration of each agent (synergism) and to convert a bacteriostatic action to a bactericidal action. Sulfadiazine is the non-proprietary name for 4-amino-N-2-pyrimidinylbenzenesulfonamide. Trimethoprim is the non-proprietary name for 5-[(3,4,5~trimethoxyphenyl) methyl]-2,4-pyrimidinediamine.

Figure 1. Structure of sulfadiazine

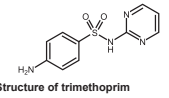
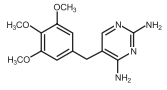


Figure 2. Structure of trimethoprim



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EQUISUL-SDT in containers of 280 mL and 560 mL with draw-off caps: Remove cap. Peel off white foil backed bottle seal and replace cap. Peel off outer cap seal exposing (hole) opening. Push an oral tip syringe into the cap opening. Invert and draw out appropriate volume of EQUISUL-SDT solution. (Note: Do not remove syringe while the bottle is inverted as possible spillage may result.) Detach syringe and administer orally at the dosage of 24 mg combined active ingredients per kilogram body weight (10.9 mg/lb) twice daily for 10 days. EQUISUL-SDT can be administered by volume at 2.7 mL per 45.4 kg (2.7 mL/100 lb) body weight.

CONTRAINDICATIONS
EQUISUL-SDT is contraindicated in horses with a known allergy to sulfadiazine, sulfonamide class antimicrobials, or trimethoprim.

WARNING
Do not use in horses intended for human consumption.

HUMAN WARNINGS
Not for use in humans. For use in animals only. Keep this and all drugs out of the reach of children. Consult a physician in the case of accidental human exposure.

Antimicrobial drugs, including sulfonamides, can cause mild to severe allergic reactions in some individuals. Avoid direct contact of the product with the skin, eyes, mouth, and clothing. Persons with a known sensitivity to sulfonamides or trimethoprim should avoid exposure to this product. If an allergic reaction occurs (e.g., skin rash, hives, difficulty breathing, facial swelling) seek medical attention.

PRECAUTIONS
Prescribing antibacterial drugs in the absence of a proven or strongly suspected bacterial infection is unlikely to provide benefit to treated animals and may increase the risk of development of drug-resistant animal pathogens.

The administration of antimicrobials, including sulfadiazine and trimethoprim, to horses under conditions of stress may be associated with acute diarrhea that can be fatal. If acute diarrhea or persistent changes in fecal consistency are observed, additional doses of EQUISUL-SDT should not be administered and appropriate therapy should be initiated.

The safe use of EQUISUL-SDT has not been evaluated in breeding, pregnant, or lactating horses. Potentiated sulfonamides should only be used in pregnant or lactating mares when the benefits to the mare justify the risks to the fetus. Use of potentiated sulfonamides during pregnancy has been associated with an increased risk of congenital abnormalities that may be related to folate deficiency**.** In humans, sulfonamides pass through the placenta, are excreted in milk, and may cause hyperbilirubinemia-induced neurotoxicity in nursing neonates.

Decreased hematopoetic activity and blood dyscrasias have been associated with the use of elevated doses and/or prolonged administration of potentiated sulfonamides. EQUISUL-SDT should be discontinued if prolonged clotting times, or decreased platelet, white blood cell or red blood cell counts are observed.

Sulfonamides should be used with caution in horses with impaired hepatic function. Although rare, sulfonamide use has been associated with fulminant hepatic necrosis in humans.

Neurologic abnormalities have been reported in several species following administration of potentiated sulfonamides. In horses, potentiated sulfonamides have been associated with gait alterations and behavior changes that resolved after discontinuation of the drug.

The safe use of EQUISUL-SDT has not been evaluated in horses less than 1 year of age.

ADVERSE REACTIONS
Adverse reactions reported during a field study of 270 horses of various breeds, ranging from 1 to 25 years of age, which had been treated with either EQUISUL-SDT (n = 182) or with a saline control (n = 88) are summarized in Table 1. At least one episode of loose stool of varying severity was observed in 69 of 182 (38%) of the EQUISUL-SDT-treated horses, and 29 of 88 (33%) saline control horses. Of those animals experiencing loose stool, 2 of 182 (1.1%) of the EQUISUL-SDT-treated horses and 0 of 88 (0%) placebo-treated horses were removed from the study due to diarrhea (defined as at least one episode of watery stool). Both cases of diarrhea in this study were self-limiting and resolved without treatment within 5–10 days after discontinuation of EQUISUL-SDT.

Table 1. Number of Horses with Adverse Reactions During the Field Study with EQUISUL-SDT

Adverse Reactions	Equisul-SDT (n=182)	Saline control (n=88)
Loose stool (including diarrhea)	69 (38%)	29 (33%)
Colic	3 (1.6%)	2 (2.2%)
Diarrhea	2 (1.1%)	0 (0%)

To report suspected adverse events, for technical assistance or to obtain a copy of the SDS, contact Aurora Pharmaceutical, Inc. at 1-888-215-1256 or www.aurorapharmaceutical.com. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at www.fda.gov/reportanimalae.

CLINICAL PHARMACOLOGY
Following oral administration, EQUISUL-SDT is rapidly absorbed and widely distributed throughout body tissues. Sulfadiazine levels are usually highest in the kidney, while the tissue concentration in other tissues is only slightly lower than plasma concentrations. Concentrations of trimethoprim are usually higher in the lungs, kidney, and liver than in the blood. Sulfadiazine and trimethoprim are both eliminated primarily by renal excretion, both by glomerular filtration and tubular secretion**.** Urine concentrations of both sulfadiazine and trimethoprim are several-fold higher than blood concentrations.[1] Sulfadiazine and trimethoprim are 20% and 35% bound to plasma protein, respectively. Administration of sulfadiazine and trimethoprim with food has no apparent effect on the absorption of sulfadiazine but the absorption of trimethoprim is decreased.

Based on a study in fed horses, trimethoprim concentrations following repeat oral administration of 24 mg/kg EQUISUL-SDT to 6 horses reached peak concentration in 0.5 to 12.0 hours. The median plasma elimination half-life was 3 hours, with a range of 2.31 to 4.96 hours. Peak sulfadiazine concentrations were reached within 1.0 to 12.0 hours in the same study. The median plasma elimination half-life for sulfadiazine was approximately 7.80 hours, with a range of 6.78 to 10.39 hours. Only minor accumulation of both drugs was observed following repeat oral administration of EQUISUL-SDT and both drugs reached steady state by day 3. Sulfadiazine and trimethoprim key steady state parameters associated with administration in 6 fed horses over a period of 7 days are found in Table 2.

Table 2. Median (Range) of sulfadiazine and trimethoprim pharmacokinetics parameters following repeat dosing of 24 mg/kg bid EQUISUL-SDT for 7 days to six horses in fed condition

Drug	Sulfadiazine	Trimethoprim
Tmax (hr)	4.75 (1.00–12.00)	8.50 (0.50–12.00)
Cmax (µg/mL)	17.63 (10.10–31.15)	0.78 (0.60–1.14)
AUC 0–12 (last dose) (hr*µg/mL)	159.35 (73.90–282.54)	5.47 (3.31–10.91)
T 1/2 (hr)	7.80 (6.78–10.39)	3.00 (2.31–4.96)

MICROBIOLOGY
EQUISUL-SDT is the combination of the sulfonamide sulfadiazine and trimethoprim. These two drugs block sequential steps in nucleic acids biosynthesis. Sulfadiazine inhibits bacterial synthesis of dihydrofolic acid by competing with para-aminobenzoic acid. Trimethoprim blocks the production of tetrahydrofolic acid from dihydrofolic acid by reversibly inhibiting dihydrofolate reductase. The two drugs act synergistically, reducing the minimum inhibitory concentration of each, while enhancing the bacteriostatic action of each separately to a bactericidal action when combined.

EQUISUL-SDT administered as a combined sulfadiazine-trimethoprim dose of 24 mg/kg body weight twice daily for 7 days provided concentrations of sulfadiazine and trimethoprim with T>MIC90 (%T) values of 100% and 98% respectively. The minimum inhibitory concentration (MIC) values for EQUISUL-SDT against indicated pathogens isolated from lower respiratory tract infections in horses enrolled in a 2010–2011 effectiveness field study are presented in Table 3. All MICs were determined in accordance with the Clinical and Laboratory Standards Institute (CLSI) Approved Standard M31-A3 using a broth microdilution system and 3% lysed horse blood.

Table 3. Trimethoprim/sulfadiazine minimum inhibitory concentration (MIC) values[a] of isolates recovered from horses with lower respiratory infection caused by *Streptococcus equi* subsp. *zooepidemicus* treated with EQUISUL-SDT in the U.S. (2010–2011)

Treatment Outcome	Success	Failure
Number of Isolates	65[c]	46
Time of Sample Collection	Pre-Treatment	Pre-Treatment
MIC 50[b] (µg/mL)	0.25/4.75	0.25/4.75
MIC 90[b] (µg/mL)	0.25/4.75	0.25/4.75
MIC Range (µg/mL)	0.12/2.4 to 0.5/9.5	0.12/2.4 to 0.5/9.5

[a] The correlation between *in vitro* susceptibility data and clinical effectiveness is unknown.
[b] The lowest MIC to encompass 50% and 90% of the most susceptible isolates, respectively.
[c] One isolate of *S. equi* subsp. *zooepidemicus* was not tested.

EFFECTIVENESS
A negative control, randomized, masked, field study evaluated the effectiveness of EQUISUL-SDT administered at 24 mg/kg body weight, orally, twice daily for 10 days for the treatment of lower respiratory tract infections in horses caused by *Streptococcus equi* subsp. *zooepidemicus*. In this study, a total of 182 horses were treated with EQUISUL-SDT, and 88 horses were treated with saline. One hundred seventy-three horses (112 EQUISUL-SDT and 61 saline) were included in the statistical analysis. Therapeutic success was characterized by absence of fever and no worsening of clinical signs at Day 5 and Day 10, and significant clinical improvement or resolution of clinical signs of lower respiratory tract infection by Day 17. The observed success rates are 58.9% (66/112) and 14.8% (9/61) for the EQUISUL-SDT and saline-treated groups, respectively.

Table 4 summarizes the statistical analysis results on the overall success rate.

Table 4. Overall Clinical Effectiveness Results

	Equisul-SDT	Saline	P-value*
Least Square Means	61%	13.1%	0.0123
* P-value and estimated success rates are based on back-transformed mean estimates from the statistical analysis.			

ANIMAL SAFETY
In a target animal safety study, EQUISUL-SDT was administered orally to 32 healthy adult horses at 0 (0X), 24 (1X), 72 (3X), or 120 (5X) mg/kg twice daily for 30 days. Loose stool was the most common abnormal observation. Observations of loose stool (pellets with liquid or unformed/cowpile stool) occurred more often in horses treated with EQUISUL-SDT with the incidence of loose stool increasing in a dose related manner. All incidents of loose stool were self-limiting and resolved without treatment.

Horses in all EQUISUL-SDT groups demonstrated statistically significantly higher mean serum creatinine concentrations, and those in the 3X and 5X groups demonstrated statistically significantly higher mean serum albumin concentrations. Statistically higher mean neutrophil counts and mean serum gamma glutamyl transferase (GGT) activity were seen in the 1X and 5X groups. Individual animal creatinine, GGT, and albumin concentrations remained within the reference range. Individual animal elevations in absolute neutrophil counts ranged up to 7.09 x 10^3/mcL (reference range: 1.96-5.31 x 10^3/mcL).

Based upon blood concentrations obtained during the study, it was noted that the sulfadiazine and trimethoprim plasma concentrations did not increase in proportion to dose. For sulfadiazine, a 3X and 5X dose resulted in an average exposure of 2.0X and 2.6X the concentrations observed following a 1X dose. For trimethoprim, the corresponding values were 2.5X and 3.5X as compared to the 1X dose. Furthermore, marked intersubject variability, particularly with sulfadiazine, resulted in substantial overlap of individual subject blood levels across the three dosing groups.

STORAGE CONDITIONS
Store upright at 59°– 86° F (15°– 30° C).
Brief periods up to 104° F (40° C) are permitted.
Protect from freezing. EQUISUL-SDT in containers of 280 mL and 560 mL — discard 60 days after removing bottle seal.

HOW SUPPLIED
EQUISUL-SDT is available in the following package sizes:
135 mL
280 mL
560 mL
900 mL

[footnote]

[1] Kahn CM, Line S, eds. The Merck Veterinary Manual. 10th Ed. Merck & Co. 2010.

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treated to a negative status, explained Pelzel-McCluskey.

Most mares will eventually clear the infection, said Pelzel-McCluskey, but some will end up with a persistent infection. She also noted that the infection and surface contamination remain even if a stallion is gelded.

Infected stallions are contaminated for life unless treated appropriately.

Other transmission sources. Transmission can occur through sources other than direct breeding. For example, inadequate biosecurity practices can lead to stallion-to-stallion transmission when using contaminated wash buckets, hands and artificial vaginas (AVs) used for semen collection. At one Kentucky facility, one stallion spread *T. equigenitalis* (the organism that causes CEM) to seven other stallions of multiple breeds in one breeding season due to equipment contamination. These stallions potentially disseminated the bacteria to other mares and stallions.

Because CEM is a bacterial infection, disinfection of equipment is achievable with chlorhexidine, dilute bleach or Roccal-D. The use of disposable plastic liners in wash buckets and wrapping the collection dummy with new plastic wrap for each stallion are strategies to prevent bacterial contamination. The AV should be cleaned with soap and water and a disinfecting solution. During collection, stallion handlers should wear disposable gloves. Pelzel-McCluskey cautioned against using sponges for cleaning because the organism can live for days on a sponge or a wet surface.

Mares generally become infected through semen from live cover or when it is collected and cooled or frozen. Even when appropriate antibiotics in common semen extender preparations are used to kill *Taylorella*, cooled shipped semen can carry the bacteria.

Pelzel-McCluskey noted, “There is

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09/2022 ad000178

SucroMate® Equine
(deslorelin acetate)
Sterile Suspension

For use in horses only.

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

BRIEF SUMMARY (for full prescribing information, see package insert)

DESCRIPTION: SucroMate® Equine (deslorelin acetate) is a sterile, synthetic gonadotropin-releasing hormone (GnRH) analog suspension. SucroMate Equine is a sustained release formulation that forms an in-situ gel upon intramuscular injection.

INDICATION: For inducing ovulation within 48 hours of treatment in cyclic estrous mares with an ovarian follicle between 30 and 40 mm in diameter.

CONTRAINDICATIONS: SucroMate Equine is contraindicated in horses known to be hypersensitive to deslorelin acetate.

WARNINGS: For use in horses (estrous mares) only. Do not use in horses intended for human consumption. For intramuscular (IM) use only. Do not administer intravascularly. Not for use in humans. Keep this and all drugs out of reach of children.

HUMAN WARNINGS – NOT FOR HUMAN USE: Pregnant women and women of childbearing age should exercise caution when handling this product. Accidental administration may lead to a disruption of the menstrual cycle. Direct contact with the skin should be avoided. If exposure occurs, contact areas should be washed immediately with alcohol followed by soap and water, as this product is insoluble in water. In case of accidental human injection, consult a physician immediately.

PRECAUTIONS: The use of GnRH analogs in cycling mares has been associated with prolonged interovulatory intervals. SucroMate Equine has not been evaluated in mares less than 3 years of age.

ADVERSE REACTIONS: Injection site swelling was observed following the administration of SucroMate Equine during the effectiveness and safety studies; all injection site swellings resolved within 5 days, and 7 – 14 days, respectively.

To report suspected adverse events, for technical assistance or to obtain a copy of the SDS, contact Thorn BioScience LLC at 1-800-456-1403. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/reportanimalae

STORAGE CONDITIONS: Store at or below 8° C.

MANUFACTURED FOR:
Thorn BioScience LLC
Louisville, KY 40204 USA
www.thornbioscience.com

Approved by FDA under NADA # 141-319
SucroMate is a registered trademark of Thorn Bioscience LLC

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Dechra



ARND BRONKHORST PHOTOGRAPHY

CEM's causative bacteria can live on surfaces for several days—longer on wet or moist surfaces.

either too great an infectious bacterial load in the semen and antibiotics used are overwhelmed, or there has been improper handling of semen extender. For example, the extender needs to stay refrigerated, but if one is preparing it and an emergency interrupts the procedure and it is left out on the counter, then it loses some efficacy."

Frozen semen with extender, often used in international shipping, also can retain CEM bacteria. She stressed that it is best not to rely on semen extender antibiotics to kill the organism, but instead to ensure that a stallion tests negative for *T. equigenitalis* before breeding or collecting.

CEM surveillance. Pelzel-McCluskey reported that currently there is not enough surveillance for CEM in active breeding stallions. Because of this lack of surveillance throughout the United States, the big outbreak of 2008-2010 was identified only when stallions were directly swabbed for CEM for export of semen to the European Union (EU). Kentucky has its own surveillance program to monitor stallions and breeding mares imported from endemic countries. These horses must be quarantined and tested per Kentucky's protocol.

The USDA import requirements have some exceptions from import testing, specifically racing Thoroughbreds or Thoroughbreds in training, even if the horses come from CEM-affected countries. Because of the large number of Thoroughbreds imported for racing into Kentucky, that state's program allows racing and in-training, intact males to wait and be tested once they transition from racing into the breeding shed.

Pelzel-McCluskey commented, "To protect their industry, Kentucky created their own state CEM testing requirements to pick up the horses that entered the USA through this loophole." No other state implements routine CEM testing.

Mares and stallions of breeding age imported from specific CEM-affected countries are required to undergo CEM testing prior to entering the United States. Some individuals in the horse world have figured out a workaround for getting horses into the country without a thorough CEM testing protocol.

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Important Safety Information: As with all drugs, side effects may occur. For use in horses (estrous mares) only. Not for use in humans. **Pregnant women and women of childbearing age should exercise caution when handling this product** as accidental administration may lead to disruption of the menstrual cycle. For intramuscular (IM) use only. Do not administer intravascularly. SucroMate Equine (deslorelin acetate) should not be given more frequently than once in a heat cycle. Injection site swelling was observed following administration. All injection site swellings resolved within 5 days of administration. Please see product insert for full prescribing information or visit www.dechra-us.com.

1. SucroMate Freedom of Information Summary (November 2010) NADA 141-319

SucroMate is a registered trademark of Thorn BioScience, LLC. Dechra is a registered trademark of Dechra Pharmaceuticals PLC. 04AD-SUC22008-0122



ARND BRONKHORST PHOTOGRAPHY IMAGES



Above: Shipped semen can be a source of CEM infection; breeding equipment must be thoroughly cleaned and disinfected.

Left: Swabbing of stallions is required for CEM testing

Pelzel-McCluskey said hundreds of stallions and mares are presented each month at the Mexican border as imports from that country despite the fact that the horses originated in Europe. These are mostly Luisitano, Andalusian, warmblood and Friesian horses that fetch a good price in the United States. In fiscal year 2021, 4,828 horses were officially imported across the Mexican border.

Because Mexico is considered a non-CEM-affected country, the horses do not have to be tested for CEM to enter the United States. It is unclear how many horses cross the border illegally from Mexico each year.

The EU has an identification program with many horses having been microchipped in their country of origin, so it is possible to see that they originated from a CEM-affected country.

Additionally, Pelzel-McCluskey noted that it is obvious that these are not Mexican-based horses since the horses don't respond to Spanish but instead respond when spoken to in German, Dutch, etc.—languages spoken in CEM-affected European countries.

Testing procedures. Mexican importation has been developed to avoid an arduous and expensive testing procedure that costs about $5,000-$7,000 for stallions. An imported stallion must stay in an approved CEM quarantine center different from animal import quarantine centers or ports through which horses pass through first.

At the CEM-quarantine center, the stallion has direct swabs of genitalia taken and cultured. Then he is test bred to two prequalified test mares. On Days 3, 6 and 9 post-breeding, direct swabs of the mares are taken of the clitoral fossa and sinuses where *Taylorella* bacteria like to hide. At 21 days post-breeding, a complement fixation test is done, and at 28 days post-breeding a full set of cultures is obtained from the mares, including cervical or endometrial swabs in non-pregnant mares. Cultures must sit on the culture plate for seven days, said Pelzel-McCluskey. This all takes time and is expensive since the stallion is kept in the quarantine center throughout the test period.

The United States is the only country requiring test breeding of two mares and samples collected post-breeding over 28 days. According to USDA data published on the 2008-2010 CEM outbreak, using only a single set of direct swabs of genitalia reportedly missed 22% of positive stallions involved in the outbreak, said Pelzel-McCluskey.

Imported mares must also remain at a CEM-quarantine center, with direct swabs taken on Days 1, 4 and 7 for culture and a complement fixation test. To be able to enter the country, the mare must test negative. The expense for mares is significant, albeit less costly than for the stallions because their stay takes about two weeks compared to a full month for the stallions. That is assuming the mare doesn't test positive. If positive, the mare has to be treated and held for 21 days before being retested.

CEM treatment. Treatment involves five consecutive days of chlorhexidine scrub and packing of genitalia with nitrofurazone ointment or silver sulfadiazine cream. Treatment only knocks back bacteria growth if not performed for the recommended time and with the recommended procedure. There is a required 21-day wait time after topical treatment before the CEM testing protocol can be performed. A horse that has been on oral antibiotics must wait seven days to test. The wait times are to ensure that the organism has ample time to grow back to detectable levels if it was not completely eliminated by treatment.

For an infected stallion, it is import-

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ant to look at the semen collection log for seven days before and seven days after the time of collection in order to determine whether other stallions might have been exposed. Stallion-to-stallion transmission has been confirmed to occur during outbreaks up to four days before or after collection of an infected stallion. *Taylorella* lives on surfaces for several days, but wet/moist materials enable greater longevity. It is important to decontaminate everything as carefully as you would do for neonatal intensive care.

Infected horses are quarantined, tested, treated and retested. Not all horses will clear the infection with a single treatment. It could take two to three rounds of treatment and retesting, and all these efforts cost money.

CEM in geldings. Infected stallions that are subsequently gelded still maintain the lifelong surface contamination of their genitalia. While they are not breeding animals, some geldings mount mares in the pasture, potentially passing on an infection.

Another transmission from geldings occurs with procedures such as sheath cleaning. If only one bucket is used, it can become contaminated with *Taylorella*. It is easy to see how the bacteria can spread throughout the barn, even among geldings.

Equine Viral Arteritis (EVA)

EVA is caused by a virus. Stallions can shed the virus intermittently in their semen. An active infection also involves nasal shedding.

Because pregnancy loss is associated with EVA, it is important for breeding mares to be vaccinated at least 21 days prior to breeding (live or artificial insemination) to a shedding stallion. Vaccine requires approval by the state veterinarian for use on a mare, and the mare must also be quarantined for a couple of weeks post-vaccine because of the risk of her shedding live vaccine virus. EVA vaccination has a good efficacy for protection.

Kentucky has a robust EVA program for stallions, since horse breeding is an important industry for that state.

Testing, vaccination and spread. There is no way to differentiate on serologic testing between a vaccinated stallion and one that has been exposed to the virus, other than with a vaccine certificate that is part of a stallion's documentation. If the stallion is seropositive and the certificate is lost, then the stallion's semen must be tested by PCR or virus isolation to determine whether he is currently shedding the virus.



COURTESY DR. PELZEL-MCCLUSKEY

Dr. Angela Pelzel-McCluskey said regulatory changes are needed for equine venereal diseases.

EVA stallion vaccination programs involve first testing the stallion as seronegative before administering the vaccine. The same applies to a mare—she is tested and if seronegative, she can be vaccinated. It is possible to test nasal swabs for PCR; EVA can be shed from the respiratory tract for weeks to months.

Risk of infection is high due to nasal shedding of EVA, so regulatory changes are needed, said Pelzel-McCluskey. She receives calls from practitioners who have identified an infected mare that contracted EVA from breeding or through nasal shedding. They ask, "What should we do with the rest of the barn?" She gave an example from New Mexico in 2006: A Quarter Horse breeding operation experienced abortions and foal loss due to EVA. Outside mares came in for breeding, then took the infection home.

Usually infection enters a facility from a previously imported stallion (Friesians or warmbloods, for example). There is no comprehensive EVA testing or control program in the United States; therefore, there is no requirement for EVA testing of imported horses.

Pelzel-McCluskey reminded owners who are actively breeding their mares that they should find out the EVA status of their selected stallion. A stallion owner should disclose information to mare owners that the stallion is an EVA shedder so they can arrange to vaccinate the mare in advance of breeding.

Take-Home Message

It is important to stop propagation and spread of venereal disease, stressed Pelzel-McCluskey. Stallions that continuously shed CEM or EVA can spread disease logarithmically if testing isn't done and/or good biosecurity practices aren't followed. Widespread outbreaks can result in a significant economic impact to the equine industry due to abortions, fetal loss and international trade restrictions. To optimize control of equine venereal diseases going forward, regulatory changes are necessary.

Veterinarians can help owners ask appropriate questions when selecting a stallion for breeding or when breeding a mare to an unknown stallion. While performing duties on the farm, veterinarians have an opportunity to discuss the risk of equine venereal diseases. Sound education and advice can help to mitigate and stop the spread of venereal diseases. EM



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Images on this page show the "before and after" of a garage converted into a small barn, including the addition of new high-efficiency strip LED lighting fixtures.

The Right Light

Here are seven tips for getting the most out of your equine facility by adding high-efficiency lighting.

By Heather E. Lewis, AIA, NCARB, AAA

In this time of rising costs, would you be interested in lowering your practice's electric bill by at least 20% per month? The new, high-efficiency lighting can do that for you!

In addition to saving significant money for you over the lifespan of the practice, good lighting design can also help create more comfortable environments throughout the hospital, better illuminated and safer medical spaces, and lower-stress equine housing spaces. In this article, we will provide some practical tips for good-quality, energy-efficient lighting in both new and renovated equine hospital spaces.



LED lighting fixtures are the best for energy efficiency and other benefits. LED lighting is about 75% more efficient than incandescent lighting and about 50% more efficient than fluorescent lighting (source: Energy.gov). Using LED fixtures is now mandated in many areas of the country, but you will want to use them even if they are not required.

If you have tried switching to LED bulbs at home in your existing lighting fixtures and are unimpressed, set aside your reservations. LED lighting has come a very long way, and modern, *commercial* LED fixtures can offer a wide

range of capabilities, including superior color rendering, balanced output of frequencies, elimination of buzz and flicker, and dimming capabilities. Well-balanced LED fixtures mimic the feel of daylight in a space, allowing for a well-lit, natural feel.

In addition to the simple concept of converting to LED, below we have provided you with our top seven tips for getting the most from your lighting and your energy use.

1.Use the sun as supplementary daylight. I have written about this in other articles, but I will repeat it here because it is so important when considering lighting! Locate openings on your building to take advantage of comfortable natural sunlight from the north and south and to avoid openings on the east and west, because the east and west directions bring in hot sun and glare. This assumes you are located in the northern hemisphere, away from the tropics.

On the south sides of buildings, overhangs work well because they exclude the hot, high-angle summer sun and they let in low-angle winter sun. Windows work the best when they are high on a wall, so they can throw light deeper into the space without being blocked by cabinetry and equipment.

Tip: If you want to save money on your energy bill, artificial lighting can be designed to shut off or dim when natural lighting levels are bright enough.

2. Install occupancy sensors. Occupancy sensors are the electronic version of your mother yelling at you to turn off the lights! These common devices turn the lights on when the room is occupied and turn them off when the room is unoccupied. You can install them in non-medical spaces such as restrooms, offices and utility rooms (i.e., laundry rooms and janitor closets). Occupancy sensors are often code mandated. But even if you are excluded from code mandates, they still make sense. Occupancy sensors can be installed easily in existing buildings, and they always provide an energy savings benefit.



TIM MURPHY-PHOTO IMAGERY

This image shows placement of windows high on the wall in an office space to make use of natural light.

3. Coordinate your lights and fans. Remember that ceiling fans, which are commonly used in equine spaces, must be coordinated with light fixture locations to avoid a "strobe light" effect. That is very unpleasant and makes for a hard-to-use, poorly lit room (or a room that gives you headaches). We often put light fixtures on either side of the center line of a room and put the fan(s) in the center. Look again at the garage/barn conversion shown on page 93.

4. Light up and down. Light fixtures are more effective when they cast light up as well as down. This is called direct/indirect lighting. Direct/indirect lighting is easier to achieve in office spaces than in equine medical spaces because in the latter, fixtures are placed snugly against the ceiling for cleanability.

5. Cross-light medical exam and treatment spaces. Lighting fixtures are designed to provide the most light from their long sides as opposed to their short sides.

When we design a medical exam or procedure space, we place a lighting fixture on either side of the exam space to cross-light the space. In procedure areas, a task light might also be added for direct light over the patient (see surgical image on page 96).

6. Provide dimmable lights for critical patients. It is impossible for a horse, dog or human being to rest under bright lights. LED lights are easily dimmed, and there is a minimal cost to add dimming ballasts.

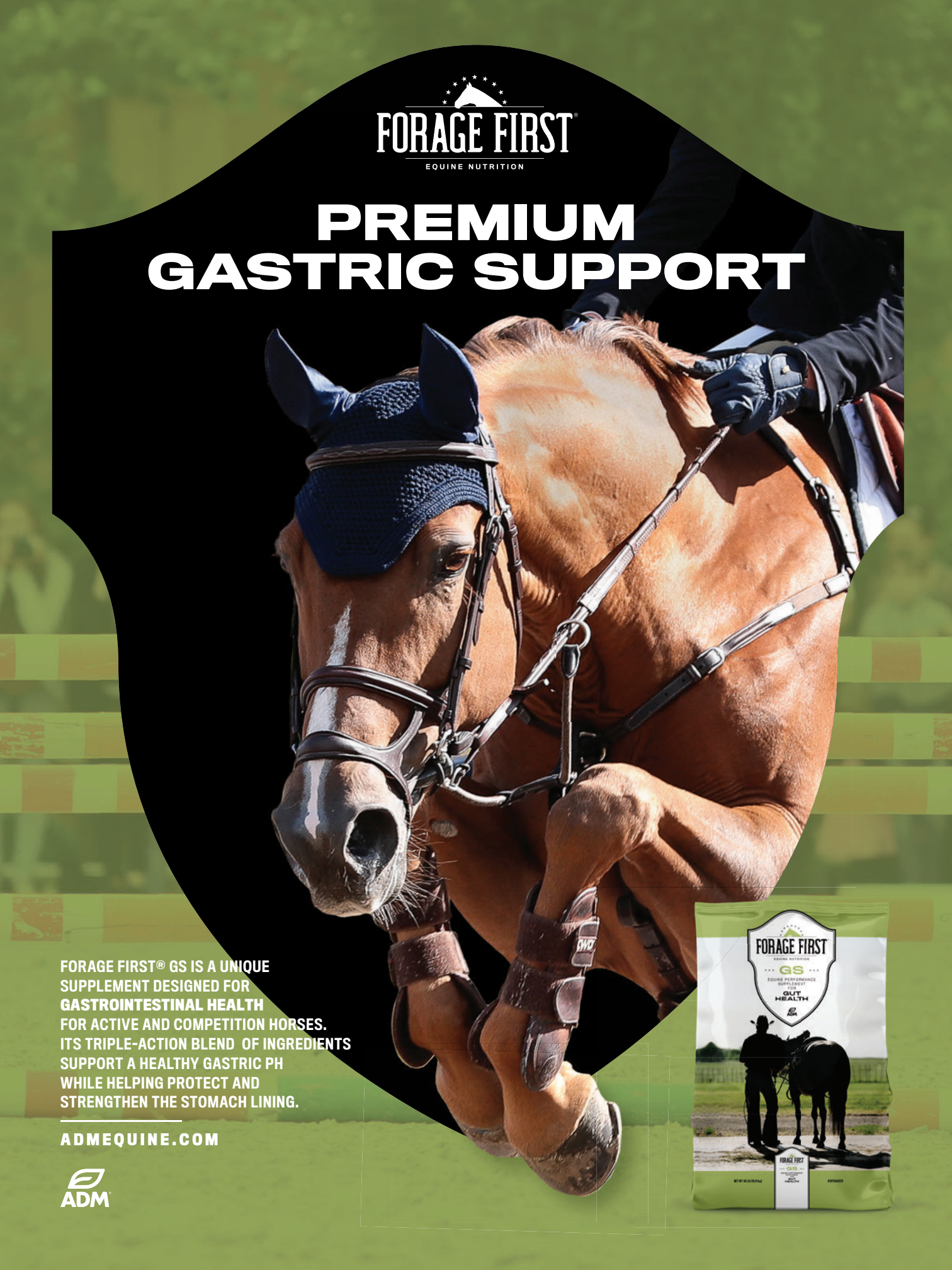
We recommend controlling each ICU stall on its own dimming switch so that medically stable horses can rest with the lights partially dimmed, while horses in crisis can be monitored under full, bright lighting for their safety.

7. Embrace the concept of differential lighting levels. We are very intentional about lighting levels in different spaces because it makes no sense to waste lighting energy when it is not needed. Medical spaces need to be brightly lit, but the rest of your hospital can be much more modest with illumination.

A foot-candle is a U.S. unit of illuminance on a surface that is one foot from a uniform point source of light and is equal to one lumen per square foot. Without really understanding this (I do not!), it is easy to understand the different illumination requirements of

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different hospital spaces:

- Surgery: 75-100 foot-candles (without the surgery lights on)
- ICU: 65-80 foot-candles (dimmable)
- Exam spaces: 45-50 foot-candles
- Office/reception (minimum): 30 foot-candles
- Utility spaces such as janitorial/laundry: 15-20 foot-candles

A commercial lighting engineer or designer can lay out the fixtures so that you have proper lighting where you need it and not where you do not. This saves money and energy.

To the Sun

If you wish to go further than the energy-saving ideas presented above, a next logical step is to consider photovoltaic (solar) panels on the roofs of the buildings to harvest solar energy.

These can be converted into electricity for lighting, thereby radically reducing your practice's reliance on electricity from the grid.

Photovoltaic panels are expensive, but you could consider installing the conduits and solar inverter and designing your building for future solar panel installation your as budget allows.

Take-Home Message

Well-selected and -designed lighting systems have the potential to transform how your hospital functions and the way you practice medicine. Whether you redesign lighting or add it, even those on tight budgets can take advantage of newer technologies to improve the lighting within their clinics and hospitals and reduce monthly electrical usage and cost. You can make the right light work for you. EM



TIM MURPHY-PHOTO IMAGERY

This illustrates the concept of cross-lighting for even lighting in a medical space. The surgery lights (suspended by the white stems from the ceiling) provide additional direct light on the surgical tasks.



TOBIN ROGERS

This shows a classroom space with natural light and pendant fixtures that allow for lighting of the ceiling surface. This eliminates a cave effect, resulting in an evenly lit space.



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While this relief program is worth pursuing, the veterinary industry needs to seek meaningful changes to federal student loan programs.

Student Loan Relief Program

While this program might assist many veterinarians, it will not change the issue of educational debt that our profession faces.

By Amy L. Grice, VMD, MBA

On August 24, 2022, President Biden announced a plan to give relief to borrowers by forgiveness of a portion of their educational loan debt. During his campaign in 2020, he promised to provide student debt relief because he believes that while a college education should be a ticket to a middle-class life, the cost of borrowing for college can be a lifelong burden for some students.

According to a fact sheet released by the White House, "Since 1980, the total cost of both four-year public and four-year private college has nearly tripled, even after accounting for inflation. Federal support has not kept up: Pell Grants once covered nearly 80 percent of the cost of a four-year public college degree for students from working families, but now only cover a third. That has left many students from low- and middle-income families with no choice but to borrow if they want to get a degree. According to a Department of Education analysis, the typical undergraduate student with loans now graduates with nearly $25,000 in debt."

The three-part plan, administered by the Department of Education, will provide up to $20,000 in debt cancellation to Pell Grant recipients with federal loans and up to $10,000 in debt cancellation to non-Pell Grant recipients.

Borrowers are only eligible for this relief if their individual income is less than $125,000 ($250,000 for married couples). No high-income individual or high-income household—in the top 5% of incomes—will be able to take advantage of this program.

The Department of Education estimates that, among borrowers who are no longer in school, nearly 90% of relief dol-

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500 mg/mL injection
For intravenous use in horses
Non-steroidal anti-inflammatory drug (NSAID)

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

Before using this product, please consult the product insert, a summary of which follows:

Indication: Zimeta® (dipyrone injection) is indicated for the control of pyrexia in horses.

Dosage and Administration: Always provide the Client Information Sheet with the prescription. Administer Zimeta by intravenous injection, once or twice daily, at 12 hour intervals, for up to three days, at a dosage of 30 mg/kg (13.6 mg/lb). **See product insert for complete dosing and administration information.**

Contraindications: Horses with hypersensitivity to dipyrone should not receive Zimeta. Due to the prolongation of prothrombin time (PT) and associated clinical signs of coagulopathy, dipyrone should not be given more frequently than every 12 hours.

Warnings: For use in horses only. Do not use in horses intended for human consumption. Do not use in any food producing animals, including lactating dairy animals.

Human Warnings: Care should be taken to ensure that dipyrone is not accidentally injected into humans as studies have indicated that dipyrone can cause agranulocytosis in humans.

Not for use in humans. Keep this and all drugs out of reach of children. In case of accidental exposure, contact a physician immediately. Direct contact with the skin should be avoided. If contact occurs, the skin should be washed immediately with soap and water. As with all injectable drugs causing profound physiological effects, routine precautions should be employed by practitioners when handling and using loaded syringes to prevent accidental self-injection.

Precautions: Horses should undergo a thorough history and physical examination before initiation of any NSAID therapy.

As a class, NSAIDs may be associated with platelet dysfunction and coagulopathy. Zimeta has been shown to cause prolongation of coagulation parameters in horses. Therefore, horses on Zimeta should be monitored for clinical signs of coagulopathy. Caution should be used in horses at risk for hemorrhage.

As a class, NSAIDs may be associated with gastrointestinal, renal, and hepatic toxicity. Sensitivity to drug-associated adverse events varies with the individual patient. Consider stopping therapy if adverse reactions, such as prolonged inappetence or abnormal feces, could be attributed to gastrointestinal toxicity. Patients at greatest risk for adverse events are those that are dehydrated, on diuretic therapy, or those with existing renal, cardiovascular, and/or hepatic dysfunction. Concurrent administration of potentially nephrotoxic drugs should be carefully approached or avoided. Since many NSAIDs possess the potential to produce gastrointestinal ulcerations and/or gastrointestinal perforation, concomitant use of Zimeta with other anti-inflammatory drugs, such as NSAIDs or corticosteroids, should be avoided. The influence of concomitant drugs that may inhibit the metabolism of Zimeta has not been evaluated. Drug compatibility should be monitored in patients requiring adjunctive therapy.

The safe use of Zimeta in horses less than three years of age, horses used for breeding, or in pregnant or lactating mares has not been evaluated. Consider appropriate washout times when switching from one NSAID to another NSAID or a corticosteroid.

Adverse Reactions: Adverse reactions reported in a controlled field study of 138 horses of various breeds, ranging in age from 1 to 32 years of age, treated with Zimeta (n=107) or control product (n=31) are summarized in Table 1. The control product was a vehicle control (solution minus dipyrone) with additional ingredients added to maintain masking during administration.

Table 1: Adverse Reactions Reported During the Field Study with Zimeta

Adverse Reaction	Zimeta (dipyrone injection) (N=107)	Control Product (N=31)
Elevated Serum Sorbitol Dehydrogenase (SDH)	5 (5%)	5 (16%)
Hypoalbuminemia	3 (3%)	1 (3%)
Gastric Ulcers	2 (2%)	0 (0%)
Hyperemic Mucosa Right Dorsal Colon	1 (1%)	0 (0%)
Prolonged Activated Partial Thromboplastin Time (APTT)	1 (1%)	0 (0%)
Elevated Creatinine	1 (1%)	0 (0%)
Injection Site Reaction	1 (1%)	0 (0%)
Anorexia	1 (1%)	1 (3%)

See Product Insert for complete Adverse Reaction information.

Information for Owners or Person Treating Horse: A Client Information Sheet should be provided to the person treating the horse. Treatment administrators and caretakers should be aware of the potential for adverse reactions and the clinical signs associated with NSAID intolerance. Adverse reactions may include colic, diarrhea, and decreased appetite. Serious adverse reactions can occur without warning and, in some situations, result in death. Clients should be advised to discontinue NSAID therapy and contact their veterinarian immediately if any signs of intolerance are observed.

Effectiveness: The effectiveness phase was a randomized, masked, controlled, multicenter, field study conducted to evaluate the effectiveness of Zimeta (dipyrone injection) administered intravenously at 30 mg/kg bodyweight in horses over one year of age with naturally occurring fevers. Enrolled horses had a rectal temperature ≥102.0°F. A horse was considered a treatment success if 6 hours following a single dose of study drug administration the rectal temperature decreased ≥2.0°F from hour 0, or the temperature decreased to normal (≤101.0°F).

One hundred and thirty-eight horses received treatment (104 Zimeta and 34 control product) and 137 horses (103 Zimeta and 34 control product) were included in the statistical analysis for effectiveness. At 6 hours post-treatment, the success rate was 74.8% (77/103) of Zimeta treated horses and 20.6% (7/34) of control horses. The results of the field study demonstrate that Zimeta administered at 30 mg/kg intravenously was effective for the control of pyrexia 6 hours following treatment administration.

Refer to the Product Insert for complete Effectiveness information.

Storage Information: Store at Controlled Room Temperature between 20° and 25°C (68° and 77°F); with excursions permitted between 15° and 30°C (59° and 86°F). Protect from light. Multi-dose vial. Use within 30 days of first puncture.

How Supplied: Zimeta is available as a 500 mg/mL solution in a 100 mL, multi-dose vial.

Approved by FDA under NADA # 141-513 NDC 17033-905-10

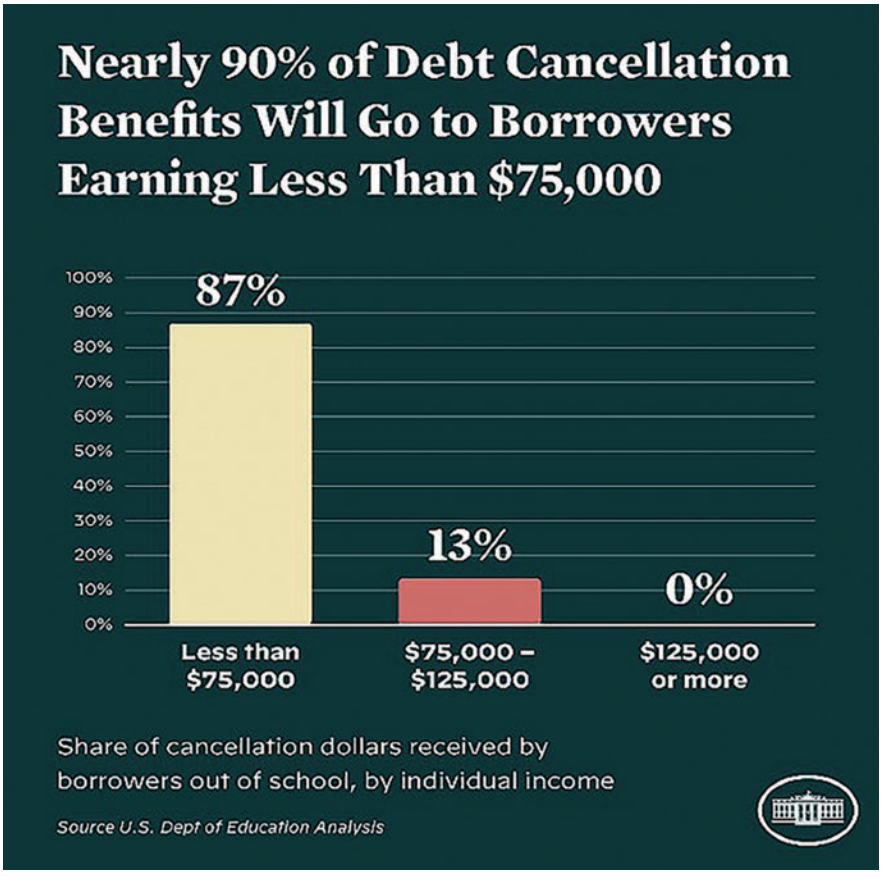
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To report adverse reactions contact Dehcra Veterinary Products at: 866-933-2472.

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Among borrowers who are no longer in school, nearly 90% of relief dollars will go to those earning less than $75,000 a year.

lars will go to those earning less than $75,000 a year.

The Biden administration expects that its plan will provide relief to as many as 43 million Americans. More than 12 million Americans in their 30s—which is almost a quarter of this age cohort—still have unpaid student debt.

In addition, the pause on federal student loan repayment will be extended through December 31, 2022. Borrowers will be expected to resume payments on their educational loans in January 2023.

A new income-driven repayment plan has also been proposed that caps monthly payments for undergraduate loans at 5% of a borrower's discretionary income, which is half of the rate that borrowers must pay now under most existing plans. This means that the average annual student loan payment for undergraduate debt will be lowered by more than $1,000 for both current and future borrowers. While this undergraduate plan will not be of much help to veterinarians and others with high graduate school debt, it might benefit some.

More importantly, borrowers working in public service are entitled to earn credit toward debt relief under the Public Service Loan Forgiveness (PSLF) program. Because of complex eligibility restrictions, historic implementation failures and poor counseling given to borrowers, many borrowers have not received the credit they deserve for their public service.

The Department of Education intends to reboot the Public Service Loan

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Zimeta is indicated for the control of pyrexia in horses

Important Safety Information

Zimeta® (dipyrone injection) should not be used more frequently than every 12 hours. For use in horses only. Do not use in horses with a hypersensitivity to dipyrone, horses intended for human consumption or any food producing animals, including lactating dairy animals. Not for use in humans, avoid contact with skin and keep out of reach of children. Take care to avoid accidental self-injection and use routine precautions when handling and using loaded syringes. Prior to use, horses should undergo a thorough history and physical examination. Monitor for clinical signs of coagulopathy and use caution in horses at risk for hemorrhage. Concomitant use with other NSAIDs, corticosteroids and nephrotoxic drugs, should be avoided. As a class, NSAIDs may be associated with gastrointestinal, renal, and hepatic toxicity. The most common adverse reactions observed during clinical trials were Elevated Serum Sorbitol Dehydrogenase (SDH), Hypoalbuminemia and Gastric Ulcers.
For additional information, see brief summary of prescribing information on the following page.

References: 1. Zimeta® (dipyrone injection) [package insert], Rev. 12/2020. **2.** Morresey PR, et al. Randomized blinded controlled trial of dipyrone as a treatment for pyrexia in horses. *Am J Vet Res.* 2019;80(3):294-299.

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Forgiveness (PSLF) program by making sure that borrowers who have worked at a nonprofit, in the military, or in federal, state, tribal or local government, and have made 120 educational payments, receive appropriate credit toward loan forgiveness.

Temporary changes that end on October 31, 2022, provide flexibility that makes it easier than ever to receive forgiveness by allowing borrowers to receive credit for past periods of repayment that would otherwise not qualify for PSLF. Enrollments on or after November 1, 2022, will not be eligible for this treatment. They encourage borrowers to sign up immediately by visiting www.whitehouse.gov/publicserviceloanforgiveness/?utm_source=pslf.gov.

Previous problems with the PSLF have left many veterinary borrowers with broken promises. It is hoped that these issues will finally be resolved through this action. To investigate whether your employer qualifies you for PSLF, utilize the tool at https://studentaid.gov/pslf/.

You might be wondering which loans will qualify for this program.

Nearly all federal student loans will qualify for forgiveness, including direct subsidized or unsubsidized loans and graduate or parent PLUS loans.

At this time, it is not yet clear whether Federal Family Education loans (FFEL) and Perkins loans will qualify. However, if your loans qualify for the federal student loan payment pause, they're likely eligible for this forgiveness opportunity.

According to Forbes Advisor, about half of FFEL loans are currently held by private lenders, but they state that the Department of Education is working with those lenders to include FFEL loans in this forgiveness opportunity (www.forbes.com/advisor/student-loans/student-loan-forgiveness-faqs/).

Although many of the sources of information about this new program talk about undergraduate loans, if you have federal loans used for professional school, you are eligible for forgiveness of $10,000-$20,000.

In order to claim the reduction in the federal loan balance, a simple application process for borrowers will be developed and made available no later than the end of the year, according to the Department of Education.

Borrowers can learn more at https://studentaid.gov/debt-relief-announcement/ and can sign up to hear when the application becomes available at www.ed.gov/subscriptions.



GETTY IMAGES/ISTOCKPHOTO

Nearly 8 million of the eligible 43 million borrowers might be eligible to receive relief automatically because their relevant income data is already available to the department, but it is recommended that nothing be assumed.

Thankfully, the debt relief will not be treated as taxable income for federal income tax purposes. However, some states might tax the amount forgiven.

According to an analysis from the nonprofit Tax Foundation, 13 states, including Arkansas, Hawaii, Idaho, Kentucky, Massachusetts, Minnesota, Mississippi, New York, Pennsylvania, South Carolina, Virginia, West Virginia and Wisconsin, might tax the forgiven student debt.

To investigate how student loan relief could affect your state tax bill, check with your state's department of revenue (www.irs.gov/businesses/small-businesses-self-employed/state-government-websites) or speak with a tax professional. But remember that whatever tax you pay will be much lower than the amount forgiven.

There is some worry about the legality of the president canceling federal student loans, with a high likelihood that the plan will face legal challenges in the coming months. As with many other issues, legal experts remain divided over whether or not the plan will be struck down by a court. Borrowers should refer to StudentAid.gov for the latest information.

Take-Home Message

With veterinary educational debt averaging $188,853 for those graduates with debt, a forgiveness of $10,000 will be of little help. Certainly, it is worth pursuing, but conversations should continue with our federal government to adopt meaningful changes to federal loan programs such as minimizing interest rates and maximizing credit for those who work in underserved areas or for nonprofits.

In addition, innovative ways to provide a veterinary medical education in a shorter number of years might need to be developed.

While this program is a step that will assist many equine veterinarians, it will not change the difficult reality that our profession faces with regard to educational debt. EM

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Having shared ethics in a practice can help create a cohesive brand identity.

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Each day, seek to live up to your values in everything you do.

By Amy L. Grice, VMD, MBA

Ethics is a broad term that explores the nature of moral behavior and specific moral choices that might need to be made. In general, moral norms for ethical conduct are common to humans and transcend cultures, regions, religions and other group identities, and they make up the "golden rules" (e.g., not to kill or harm or cause suffering to others; not to steal; not to punish the innocent; to be truthful; to obey the law; to nurture the young and dependent; to help the suffering; and to rescue those in danger).

There are also ethical norms for groups arising from culture, religion or profession. These norms typically include responsibilities, ideals and professional standards. For example, the physician's "accepted role" is to provide competent and trustworthy service to his or her patients. Ethics is also an inherent part of clinical veterinary medicine, as the veterinarian has an ethical obligation to benefit the patient, to avoid or minimize harm, and to respect the values and preferences of the owner.

Beneficence, nonmaleficence, autonomy and justice are the four fundamental principles of medical ethics. The principle of beneficence is the obligation of the physician to act for the benefit of the patient and to promote the patient's welfare. Nonmaleficence is the obligation of a physician not to harm the patient; to thoroughly weigh the benefits against risks of all interventions and treatments; to avoid those that are excessively difficult for the patient to tolerate; and to choose the best course of action without regard for financial reward.

The principle of autonomy allows for clients (or patients, in human medicine) to have the power to make rational decisions and moral choices, and to be allowed to exercise their capacity for decision-making for their animals. Justice involves the need for truth, which includes informed consent. The requirements of informed consent for a medical or surgical procedure include that the client must understand the risks and benefits, be allowed to decide, receive a



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1 Data on file.

2 Adequan® i.m. Package Insert, Rev 1/19.

3 Burba DJ, Collier MA, DeBault LE, Hanson-Painton O, Thompson HC, Holder CL: In vivo kinetic study on uptake and distribution of intramuscular tritium-labeled polysulfated glycosaminoglycan in equine body fluid compartments and articular cartilage in an osteochondral defect model. *J Equine Vet Sci* 1993; 13: 696-703.

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Veterinarians need to advocate for what is best for a horse in the short and long term despite the pressures of trainers, riders and owners.

full disclosure, comprehend the disclosure, act voluntarily and consent to the proposed procedure.

In addition to these principles, according to the AVMA, all veterinarians are expected to adhere to a progressive code of ethical conduct known as the Principles of Veterinary Medical Ethics (PVME; see www.avma.org/resources-tools/avma-policies/principles-veterinary-medical-ethics-avma).

Among the principles are the following:

- A veterinarian shall be influenced only by the welfare of the patient, the needs of the client, the safety of the public and the need to uphold the public trust vested in the veterinary profession, and shall avoid conflict of interest or the appearance thereof.
- A veterinarian shall not allow any interests, especially financial interests, other than those mentioned above to influence the choice of treatment or animal care.
- A veterinarian shall not offer or receive any financial incentive solely for the referral of a patient.
- Performance of surgical or other procedures in any species for the purpose of concealing genetic defects in animals to be shown, raced, bred or sold as breeding animals is misleading to the public and is unethical.
- Veterinarians must not defame or injure the professional standing or reputation of other veterinarians in a false or misleading manner. Veterinarians must be honest and fair in their relations with others, and they shall not engage in fraud, misrepresentation or deceit.
- It is unethical for veterinarians to identify themselves as members of an AVMA-recognized specialty organization if such certification has not been awarded and maintained. Only those veterinarians who have been certified by an AVMA-recognized veterinary specialty organization should refer to themselves as specialists.

The AAEP describes ethical professional behavior in this way: "Professional ethics embodies the behaviors of honesty, integrity and kindness while obeying rules and regulations set forth with mutual respect for opinion and preservation of dignity in interpersonal relationships. The conduct should be in a manner that will enhance the worthiness of the profession. The ethical practice of medicine includes those remedies and treatments that have, as their short or long-term goal, the health and welfare of the horse."

Equine Practice Differences

Equine practice differs from companion animal practice in many ways, including the number of ethical dilemmas that are encountered. The multiple relationships that horse doctors have with trainers, riders and owners can contribute to these situations when each of these people have different objectives, some



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While embracing your values can be difficult at times, the rewards of inner peace are substantial.

of which might not have the horse's best interests in the forefront.

For example, a trainer might want the horse to compete in the top levels to increase the trainer's business visibility and financial success, and the rider might be looking for personal achievement and accolades through competition, while the owner is seeking to increase the horse's value through a successful performance.

If the horse has a condition that, with treatment, could allow it to compete—but with the risk of an exacerbation of the problem—who speaks for the horse? Where does the veterinarian's moral obligation begin and end? Which of the principles listed above are satisfied? Each doctor's answer might be somewhat different, depending on his or her personal values.

Difficulties most often arise when a veterinarian's personal values clash with those of an employer or client. For example, I was asked early in my career to euthanize a brightly colored blanket Appaloosa so that the owner could skin the carcass to make a rug. Horrified, I refused the request. I never knew what happened, as the client was never heard from again, but there was no possible way my values would allow me to participate.

However, maybe a different veterinarian would have taken the position that facilitating a good death (the definition of euthanasia) was of the highest service to the horse, considering the possibility that the owner might have taken matters into his own hands without adequate knowledge to effect a humane death.

This story highlights the fact that individual values are the foundation of individual ethical behavior as well as helping to explain why position statements set out by professional associations can assist doctors in evaluating moral choices in the profession.

Multiple Personalities

When multiple veterinarians work together at a practice, having shared values is very helpful in creating a cohesive practice brand identity. In addition, those common beliefs will often lead to similar ethical stances among the individuals when challenging situations arise.

Young veterinarians can seek out practices with similar values by asking careful questions of potential employers. By preparing a description of several situations that would pose an ethical dilemma, a job seeker could query the potential employer as to how he or she would handle that situation, and whether there was uniformity in the approach across the practice. A simple method would be to ask what the practice's most important values are and to make sure they are in alignment.

The conflict of financial interests or incentives can be found in many situations. A farm manager might receive discounted care for his or her personal broodmare in return for delivering the care of the rest of the mares boarding at the farm to a particular veterinarian or practice. A show horse trainer typically dictates which veterinarian works on the horses he or she trains, which can bring in substantial revenue but can lead to uncomfortable pressure to follow the prescriptive requests of the trainer. An example might be when the call comes in to prep horses with multiple joint injections before an important event. A doctor could also be asked to do a pre-purchase examination for a new client on a horse that is a regular patient.

Each individual must find his or her comfort zone in these situations and ensure he or she is meeting professional standards.

Specialist vs. Special Interest

A veterinarian might wish to limit his or her practice to a particular area of interest. However, that individual must



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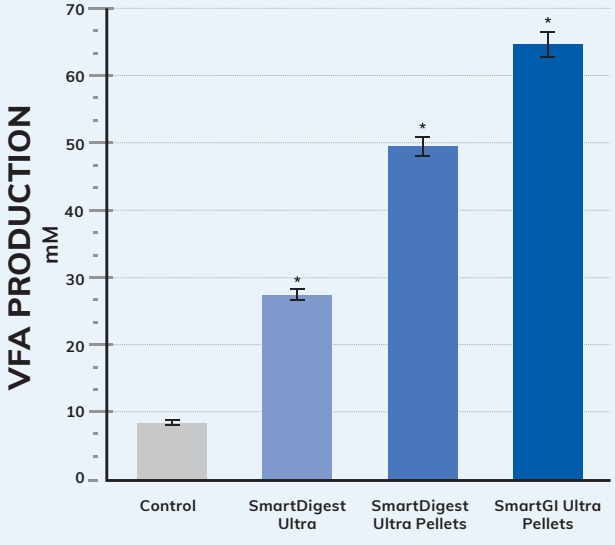
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be careful not to represent him- or herself as a "specialist" unless board certified. Using the wording "a special interest in" or "focusing on" can be ethical ways to indicate this limitation and interest.

Because ethical stances are shaped by personal values, it is important for veterinarians to seek to fully understand others' perspectives rather than judging them negatively if beliefs or behaviors differ. Using an attitude of curiosity, a doctor can query a client or a colleague to understand how that individual sees an issue. After listening with an open mind, often the veterinarian finds that the other person has a credible foundation to support his or her view.

Despite this understanding, in order to protect mental health and build resilience, veterinarians should not acquiesce to perform services that violate their values and ethics. Studies have shown that ethical dilemmas that compromise values and ethics often markedly increase work-related stress.[1]

Take-Home Message

Each day, seek to live up to your values in everything you do. When seeking to hire an associate or be hired as one, explore values and ethics. By committing to ethical practice every day, veterinarians can decrease some of their risks for depression and anxiety by minimizing their moral distress.

Embracing their values as their personal True North can help doctors thrive by supporting their deepest beliefs in their work. Although this can be difficult at times, the rewards of inner peace are substantial. EM

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Social media success is driven by strategy and an intentional approach to creating and sharing content.

Nine Social Media Tips for Veterinarians

Here are nine ways veterinarians can start or improve their social media presence.

By Katie Navarra

When McKee-Pownall Equine Services in Canada hires a new veterinarian, a video is created and shared through social media to introduce the new staff member. The practice produces and posts "Meet the Vet" videos on YouTube, which is also shared to the practice's Facebook and Instagram accounts. The goal is to facilitate a comfort level with the new vet before he or she arrives at the client's barn.

"The videos make the introduction a lot easier when people have a chance to see a video of who will be caring for their horse," said Mike Pownall, DVM, MBA, co-owner of the Ontario practice with his wife, Melissa McKee, DVM, and their business partner Maggie Turner, DVM. "I try to keep them to two minutes or less unless the individual has numerous interesting tidbits—then we'll record two parts. People don't want to watch a five-minute video."

The success has been driven by strategy and an intentional approach to creating, posting and sharing content.

In the article that follows, you'll find eight additional tips you can use to maximize your social media efforts.

A Modern-Day James Herriot

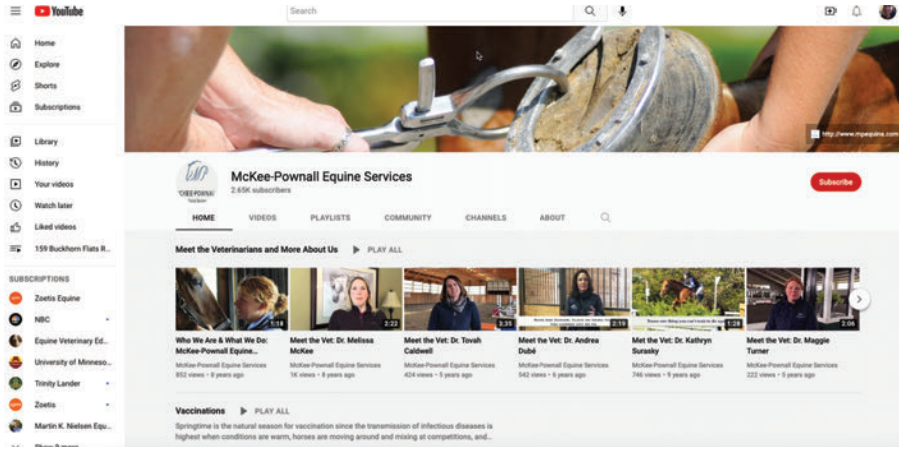
Social media drives people's desire to be entertained. Giving viewers a behind-the-scenes look at your business increases the likelihood of the viewer stopping and engaging rather than scrolling past. Some of the most exciting content to viewers might not be directly related to horse care. Taking a page out of author-veterinarian James Herriot's book can create similar levels of connection through social media.

"People like seeing the behind the scenes of what happens day to day. Many people in the past had thoughts of being a vet and chose another career," Herriot (real name: James Alfred Wight) once said. "Just showing what a 'day in the life' of a vet looks like draws people in." You can do this by:

- posting a picture of other animals you might see on the farm;



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Above: You should know if your information translates well to various devices. At left: McKee-Pownall's YouTube channel.

- sharing a unique barn feature that other horse owners might like to add to their barns;
- highlighting an interesting site you drive past while traveling to an appointment; or
- sharing your favorite playlist, podcasts or audiobooks to pass the travel time.

Adding educational tidbits and interesting anecdotes amplifies the message you're sharing, and consumers appreciate learning something new without feeling pressured to buy.

Show Case Studies

Viewers crave case studies that show a variety of scenarios veterinarians encounter with client horses and the diagnoses, treatments and outcomes. Sometimes the gorier the video or photos, the more people engage and react, but be careful of being too graphic.

Pownall recommended including a disclaimer warning about the graphic content in case people don't want to see it. While people are intrigued by the treatment of gory injuries, no one wants to see a suffering animal.

"It is one thing to look at a leg or shoulder with a flap of the skin that a vet is stitching and a very different thing to see a horse down and struggling in a ditch," said Pownall. "I'm a vet and don't want to see that. We're healers and want to show off how we make a sick animal feel better."

Give Them Something To Talk About

You've likely had that "why didn't I think of that" moment when you see another veterinarian's post spark interaction with an audience. That often starts with creating a post that gives the clients something to talk about and share.

A single hashtag might not seem like it will have a significant impact, but it can make a campaign go viral and get your message out to a broader audience. Looking outside of the equine industry, one example is theSkimm media company's #showusyourleave. Hundreds of brands responded by transparently sharing their paid family leave benefits.

Be Intentional

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As with all drugs, side effects may occur. In field studies and post-approval experience the most common side effects reported were signs of discomfort, nervousness, and colic. Other signs reported were: renal insufficiency/failure, anorexia, lethargy, hypercalcemia, behavioral disorders, hyperkalemia, hyperactivity, recumbency, hyperthermia, injection site reactions, muscle tremor, urticaria, hyperglycemia, and fracture. **In some cases, death has been reported as an outcome of these adverse events.** The safe use of OSPHOS has not been evaluated in horses less than 4 years of age or breeding horses. OSPHOS should not be used in pregnant or lactating mares, or mares intended for breeding. NSAIDs should not be used concurrently with OSPHOS. **Concurrent use of NSAIDs with OSPHOS may increase the risk of renal toxicity and acute renal failure.** Use of OSPHOS in patients with conditions affecting renal function or mineral or electrolyte homeostasis is not recommended. Refer to the prescribing information for complete details or visit www.dechra-us.com.

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

* Freedom of Information Summary, Original New Animal Drug Application, approved by FDA under NADA # 141-427, for OSPHOS. April 28, 2014.

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DESCRIPTION: Clodronate disodium is a non-amino, chloro-containing bisphosphonate. Chemically, clodronate disodium is (dichloromethylene) diphosphonic acid disodium salt and is manufactured from the tetrahydrate form.

INDICATION: For the control of clinical signs associated with navicular syndrome in horses.

CONTRAINDICATIONS: Horses with hypersensitivity to clodronate disodium should not receive OSPHOS. Do not use in horses with impaired renal function or with a history of renal disease.

WARNINGS: Do not use in horses intended for human consumption.

HUMAN WARNINGS: Not for human use. Keep this and all drugs out of the reach of children. Consult a physician in case of accidental human exposure.

PRECAUTIONS: OSPHOS has been associated with renal toxicity. Concurrent administration of other potentially nephrotoxic drugs should be approached with caution and renal function should be monitored. Use of bisphosphonates in patients with conditions or diseases affecting renal function is not recommended. Horses should be well-hydrated prior to and after the administration of OSPHOS due to the potential for adverse renal events. Water intake and urine output should be monitored for 3-5 days post-treatment and any changes from baseline should elicit further evaluation. As a class, bisphosphonates may be associated with gastrointestinal and renal toxicity. Sensitivity to drug associated adverse reactions varies with the individual patient. Renal and gastrointestinal adverse reactions may be associated with plasma concentrations of the drug. Bisphosphonates are excreted by the kidney; therefore, conditions causing renal impairment may increase plasma bisphosphonate concentrations resulting in an increased risk for adverse reactions. Concurrent administration of other potentially nephrotoxic drugs should be approached with caution and renal function should be monitored. Use of bisphosphonates in patients with conditions or diseases affecting renal function is not recommended. Administration of bisphosphonates has been associated with abdominal pain (colic), discomfort, and agitation in horses. Clinical signs usually occur shortly after drug administration and may be associated with alterations in intestinal motility. In horses treated with OSPHOS these clinical signs usually began within 2 hours of treatment. Horses should be monitored for at least 2 hours following administration of OSPHOS.

Bisphosphonates affect plasma concentrations of some minerals and electrolytes such as calcium, magnesium and potassium, immediately post-treatment, with effects lasting up to several hours. Caution should be used when administering bisphosphonates to horses with conditions affecting mineral or electrolyte homeostasis (e.g. hyperkalemic periodic paralysis, hypocalcemia, etc.).
The safe use of OSPHOS has not been evaluated in horses less than 4 years of age. The effect of bisphosphonates on the skeleton of growing horses has not been studied; however, bisphosphonates inhibit osteoclast activity which impacts bone turnover and may affect bone growth.

Bisphosphonates should not be used in pregnant or lactating mares, or mares intended for breeding. The safe use of OSPHOS has not been evaluated in breeding horses or pregnant or lactating mares. Bisphosphonates are incorporated into the bone matrix, from where they are gradually released over periods of months to years. The extent of bisphosphonate incorporation into adult bone, and hence, the amount available for release back into the systemic circulation, is directly related to the total dose and duration of bisphosphonate use. Bisphosphonates have been shown to cause fetal developmental abnormalities in laboratory animals. The uptake of bisphosphonates into fetal bone may be greater than into maternal bone creating a possible risk for skeletal or other abnormalities in the fetus. Many drugs, including bisphosphonates, may be excreted in milk and may be absorbed by nursing animals.

Increased bone fragility has been observed in animals treated with bisphosphonates at high doses or for long periods of time. Bisphosphonates inhibit bone resorption and decrease bone turnover which may lead to an inability to repair micro damage within the bone. In humans, atypical femur fractures have been reported in patients on long term bisphosphonate therapy; however, a causal relationship has not been established.

ADVERSE REACTIONS: The most common adverse reactions reported in the field study were clinical signs of discomfort or nervousness, colic and/or pawing. Other signs reported were lip licking, yawning, head shaking, injection site swelling, and hives/pruritus.

POST-APPROVAL EXPERIENCE (December 2018): The following adverse events are based on post-approval adverse drug experience reporting. Not all adverse events are reported to FDA/CVM. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data.

The following adverse events are listed in decreasing order of reporting frequency: renal failure, polyuria, polydipsia, abdominal pain, anorexia, lethargy, hypercalcemia, behavioral disorder, discomfort, hyperkalemia, hyperactivity, recumbency, hyperthermia, injection site reactions, muscle tremor, urticaria, hyperglycemia, and fracture. In some cases, death has been reported as an outcome of the adverse events listed above.

INFORMATION FOR HORSE OWNERS: Owners should be advised to:

- NOT administer NSAIDs.
- Ensure horses have access to adequate water before and after administration of OSPHOS.
- Observe their horse for at least 2 hours post-treatment for signs of colic, agitation, and/or abnormal behavior.
- If a horse appears uncomfortable, nervous, or experiences cramping post-treatment, hand walk the horse for 15 minutes. If signs do not resolve contact the veterinarian.
- Monitor water intake and urine output for 3-5 days post-treatment.
- Contact their veterinarian if the horse displays abnormal clinical signs such as changes in drinking and urination, appetite, and attitude.

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Veterinarians should determine which platforms their clients use and focus on those.



McKee-Pownall has a variety of post types on Facebook, some entertaining and some educational.

Instagram to show activity. However, Pownall emphasized that a random post will not in itself encourage deeper relationships with customers or greater visibility.

"It's important to be more thoughtful about the message or the audience you are trying to reach," he said. "Facebook has an older audience, and Instagram attracts younger users, so the posts on each should speak to the interests of those clients."

Many vets have embraced Facebook and Instagram, but TikTok is now the most actively used social media channel—one where a lot of vets don't participate. This is not a suggestion to sign up and share content haphazardly. Instead, it's essential to understand the platform audience and determine whether it matches your client demographics in order to decide whether the effort is worth the time and investment.

Consistency is also crucial. Randomly posting a handful of days a week will not generate the attention you're looking to gain. Maybe your audience is there at 8 p.m. and you're posting in the morning.

"You need to be thoughtful about where, how and when you're posting, especially if you're spending money on promoted posts to maximize your investment," Pownall said.

Invest in Quality

Engagement is directly related to the quality of visuals and audio. Pownall recommended spending the time and money to shoot higher-quality content, which might mean hiring a company to assist.

"Many people think that recording off a phone is 'good enough,' but they don't pay attention to audio, which can pick up wind, horses chewing or the noise from a horse acting up in a stall," he said. "Poor sound quality is the biggest reason people turn off a video."

Tap the Right Person

Too often, the youngest person on the team is assigned to oversee a veterinary practice's social media efforts simply because he or she is more digitally astute.

"Just because they are on social media does not mean they know how to present your practice in the best light," he said. "They might be a horse owner, but if the practice targets middle-aged dressage riders rather than barrel racers, the individual might not have the maturity or understanding of the discipline needed to speak to your ideal client."

It's also not uncommon to hand it off to a receptionist, but that person might not always have the skills or interest in maintaining social media platforms.

"If you don't have the right person who can consistently create content and [that person is] so busy answering calls, completing administrative tasks or simply doesn't have the interest in posting, it's not going to be useful," Pownall said. "It's often good to look at hiring another company that can guide you, create posts and help navigate social media efforts to get bang for your buck."

Measure Effectiveness

Social media is designed to function as an advertising platform. The volume of organic leads (often the most valuable) is limited with the "pay-to-play" model that puts your message in front of larger audiences. For that reason, Pownall encouraged studying the results to determine whether the investment is worth the effort.

"I don't think people are budgeting or accounting for how they are getting the message out there and paying for it somehow," he said.

He recommended looking at social media efforts to determine a return on investment to understand how much it costs your practice to gain a new client through digital platforms.

"Get your bookkeeper or accountant to add up all the money you're spending on marketing and the number of new clients you have seen from those efforts," Pownall said. "I'm a big believer in understanding the metrics of how much marketing costs compared to the value of the new client."

Hire an experienced independent contractor or marketing agency who can dig into the metrics and build a marketing plan based on the data. Choose a professional who loves and appreciates animals, Pownall added.

"I have seen vets hire people who do

advertising for ag machinery. You don't pet tractors; you want to know the features you are getting," he said. "It's not like that with animals. Vet care is selling an emotion, a peace of mind to know their horse is in good hands."

Before hiring, ask questions about the previous veterinary work that has been done and understand the person's turnaround time. You want to work with someone who can work in real time as much as possible.

"If the state vet says there has been an EHV outbreak, [you] don't want to wait two weeks for an agency to post it," he said.

Use Multiple Approaches

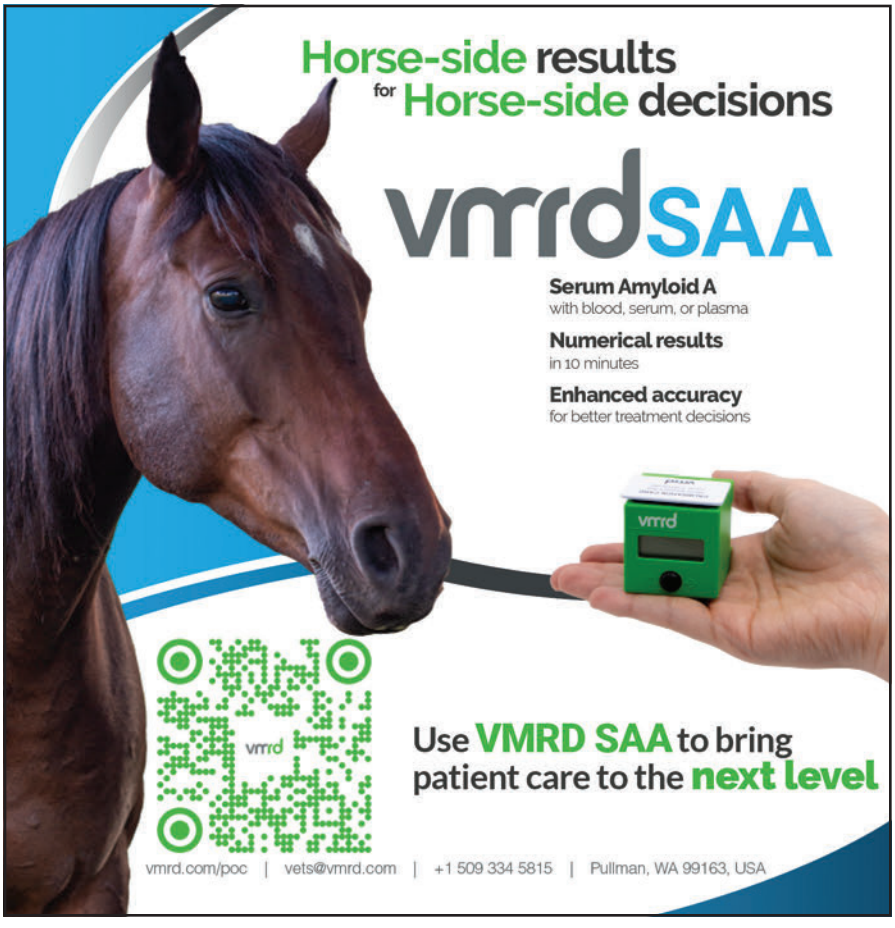
There is no denying that having a social presence is widely expected. Creating a strategy paired with your practice goals and clients is a marketing must-have. Pownall said digital newsletters offer the potential to provide the greatest return on investment.

"The most effective digital platform for a vet to have is an email list [that he or she uses] to send regularly scheduled newsletters," he said. "It is the most effective thing we do. We consistently see an uptick in client appointments for three weeks when we promote a special or service."

Focus on What You Do Well

Some veterinarians thrive on planning, creating and posting messages for their audiences. If this is you—keep sharing what's working. On the other hand, consider outsourcing these tasks if you dread them and do not have staff resources to take over.

Consistency is an essential element of any brand messaging plan. With the volume of messages online and dwindling consumer attention, sharing—and sharing often—places your vet practice top of mind. EM





By Nancy S. Loving, DVM



COURTESY DR. JOHN MADIGAN/UC DAVIS

Read the story behind Dr. John Madigan developing the rope squeeze technique to address NMS.

Madigan Foal Squeeze Technique

This simple, research-driven technique helps 'dummy' foals transition to a normal life outside the womb.

Equine practitioners dealing with newborn foals might be familiar with the Madigan Squeeze Technique to help revive a "dummy" foal suffering from neonatal maladjustment syndrome (NMS).

Yet there is a story behind how John Madigan, DVM, DACVIM, DACAW, professor emeritus of the University of California, Davis, developed the brilliant yet simplistic concept of using a rope squeeze to address this neonatal crisis. It is a study in thinking outside the box while following the science.

In a webinar sponsored by the Equine Veterinary Practice Company of New Zealand, Madigan explained the pathophysiologic reasoning behind the squeeze technique and how he and researchers arrived at this remarkable protocol.

Historically, practitioners have attributed NMS to some hypoxic or asphyxiation event occurring to the foal during birth. However, Madigan got to thinking that there is more to the story than simply a hypoxic injury during the birth process. As many as 80% of NMS foals recover within three to five





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COURTESY DR. JOHN MADIGAN/UC DAVIS

A more accurate way to describe these foals is "failure to transition to consciousness at birth."

days when supported and treated for symptomatic problems related to their extended somnolence following birth. He noted that recovery is complete, and the foal is not affected with neurologic deficits that one might expect from hypoxic injury. Rather, the foals act entirely normal, as if there never had been any delay or problem dealing with the world outside the womb.

The thought is that there must be some kind of signaling process that moderates the extended "anesthesia" that keeps a foal quiet in utero for 11 months. Then, once born into the world, the foal awakens, stands within an hour or two, bonds with its dam, and begins nursing within two to three hours. Soon, the neonate is exploring its new world and galloping around on nimble legs.

But, for the NMS foal, these events do not happen. Instead, the foal either cannot get to its legs or it wanders aimlessly, doesn't recognize its dam, and is pretty much asleep on its feet or lying recumbent, sometimes curled into a ball much like it would be in the uterus.

While on sabbatical in New Zealand in 2005, Madigan attended a welfare lecture that discussed neurosteroids in sheep; the study was entitled Progesterone Derivation and Anesthetic Neurosteroids. This was the first he'd heard of this concept. Looking back through the literature, he discovered that in 1988, Dr. Peter Rossdale had observed that NMS seemed to be associated with a rapid birth and also with cases where human intervention had hastened a foal through the birth canal.

Measurements by Rossdale in 1991 of plasma progestogens in the mare, fetus and newborn identified that progesterone transforms to allopregnanolone in both the placenta and in the fetal brain. This neurosteroid is responsible for keeping a foal asleep by working on GABA receptors much in the same way



that barbiturates or anesthetics do.

Compared to a normal foal, total progestins in NMS foals reach very high levels, and they remain high rather than rapidly declining after the first hour postpartum, as is seen in normal foals.

When Madigan measured neurosteroids, he found progesterone levels 80-fold higher than controls and other neurosteroids as much as 3,000-12,000-times higher than in normal foals. NMS foals also had higher levels of DHEA, which works as a sedative and lowers body temperature, both typical signs of maladjustment.

In addition, studies discovered that septic foals often have highly abnormal levels of neurosteroids.

Madigan identified multiple roles of neurosteroids:

- They modulate the GABA brain receptor, which is central to consciousness and important for brain development and function.
- Steroids exert organizational and motivational actions during brain development and also modulate neurotransmission.
- Certain steroid compounds, especially 5-alpha-reductase pregnanes, can cross the blood-brain barrier to exert neuro-modulatory effects on neuroactive steroids.
- Pregnane metabolites are primarily synthesized within the central nervous system from cholesterol via progesterone by the action of 5-alpha-reductase. They can also be synthesized in other tissues and readily cross the blood-brain barrier.
- The brain GABA receptor works as a chloride ion flux that can open or close with immediate effects. It also influences gut motility, the vagus nerve, autonomic regulation, and phasic and tonic inhibition on consciousness.

Madigan summarized that NMS was associated with persistence of hormones secreted *in utero* to keep the foal in a sleep-like state during pregnancy and as the foal advances through the birth canal. He pointed out that the CNS and mentation are depressed *in utero* just like in an NMS foal. While *in utero*, no ventilation is needed, and an NMS foal demonstrates poor ventilatory efforts. Due to placental and maternal functions *in utero*, there is minimal need for gastrointestinal motility, urine output, thermoregulation, pain responses or ambulation. An NMS foal demonstrates similar poor or absent responses to these stimuli or functions.

The Research Tested

To continue the search for a signaling process to advance a foal's ability to transition to life outside the uterus, Madigan's research team infused allopregnanolone into a normal foal. Within moments, the foal became ataxic and recumbent due to the effects of the hormone on the brain. Limp, floppy limbs were typical, and likely of benefit *in utero*. Using a lower dose of allopregnanolone, the team measured brain waves and found that the foal lapses into a non-REM form of sleep.

These same brain wave changes and sleep state occur in a foal laid down through the rope squeeze process.

Rather than the term "neonatal maladjustment syndrome," Madigan suggested that a more accurate way to view this may be as "failure to transition to consciousness at birth." The abnormally adjusted foal fails to bond to its dam, fails to locate the udder to nurse, is disoriented in its environment, and often wanders aimlessly around the stall or paddock. In essence, he is still asleep as if he remains in the womb.

The Solution

We are all familiar with the tendency of a foal to crumple when human arms encircle and hold them firmly. Yet there is no way for a person to maintain that pressure on a foal to achieve a steady state of quiet. The only tool needed to accomplish this technique is a smooth rope that slides easily. It is started around the foal's chest, wrapped behind the elbow, and secured with a bowline knot. Then a couple of snug half-hitches around the sternum and chest finish it off, keeping the rope in front of the umbilicus. The rope operator then gently but firmly tugs on the rope and the foal slowly folds up onto the ground, immediately falling into a sleep state.

The squeeze technique requires 20 minutes of a steady gentle pull to achieve a smooth brain wave while the foal is recumbent. It provides predictable somnolence with the foal experi-



COURTESY DR. JOHN MADIGAN/UC DAVIS

Madigan and his team have given equine practitioners an inexpensive and transformative technique to get a "dummy" foal on its feet.

encing non-REM sleep and slow wave brain activity. Heart rate, respiratory rate and body temperature all drop. The foal's pain threshold increases, endorphins increase, and so does ACTH despite no evidence of stress. There is no change in venous blood gases, and the method is extremely safe.

It has value for other procedures that require foal cooperation such as plasma infusions, ultrasound studies, radiography and some surgical procedures, but without having to resort to administration of sedatives or general anesthesia.

During the 20 minutes of somnolence using the rope squeeze technique, two hormones elevate to maintain the foal in a sleep state. Madigan pointed out that in normal circumstances, 20 minutes is a comparable duration for Stage 2 labor in a mare, with the foal remaining asleep enough to not wiggle or change position as it passes through the birth canal. Then, once that duration of squeeze is finished, the anesthetic effect is dialed down to transition the foal from 11 months of "sleep" in the womb to an active foal interacting with its new world environment.

When the rope squeeze is finished and the rope is removed, the foal awakens, stands up, shakes, nickers to its mom and begins searching for the udder. The miracle is that nothing anyone has done up to that point with a dummy foal has been able to awaken the foal from its stupor. The rope squeeze method works completely.

Once the researchers had identified the biochemistry of transition from womb to world, they tested it on myriads of foals world-wide and found that the rope squeeze technique worked every time, even on NMS foals a few days old. It costs nothing to use and gives a foal a chance at a normal life; not all NMS foals make it when only receiving supportive medical treatment the old-fashioned way.

A foal with sepsis certainly needs ancillary medical treatment, but the rope squeeze technique used in conjunction hastens recovery.

This technique is applicable to all animals and has been used for sheep, goats and cattle, to name a few. It also resembles the swaddling method that calms human babies and helps them relax and sleep.

Take-Home Message

It is so simple and so elegant—yet so complex—how Mother Nature sets up biochemical and physical controls to keep mare and foal safe.

Madigan and his team have given equine practitioners specializing in reproduction an inexpensive and transformative technique to get a "dummy" foal on its feet and jump-start him to exhibit expected, normal behaviors by a newborn. EM



Cash flow problems can stem from many issues, but the results can be catastrophic for your practice.

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Managing Cash Flow

Having the ability to forecast the practice's cash flow in the coming year can be very helpful in managing practice finances.

By Amy L. Grice, VMD, MBA

Problems with cash flow can cripple small businesses as well as large corporations. Every firm has fixed costs, most of which must be paid on a monthly or quarterly basis. Utilities, payroll, insurance, mortgages and other loan obligations are due and payable regardless of the amount of revenue earned.

For equine veterinarians, the amount of drugs and medical supplies purchased typically vary according to the season, but these invoices must be satisfied as well. Not having adequate cash to pay the bills is a source of stress that can paralyze a practice owner.

Most small businesses experience cash flow problems from time to time. These cash flow shortfalls can arise from a variety of reasons ranging from a large account falling behind in payments to a seasonal variation in revenue production. Due to the seasonality of equine veterinary practice, practice owners might sometimes need to borrow money to meet financial obligations during slow times. Unexpected events such as an injury or loss of an associate could also occur and could decrease revenue sharply.

One common option for obtaining these funds is to secure a business line of credit (LOC). A business line of credit is an arrangement between a financial institution, usually a bank, and a customer. It establishes a maximum loan balance that the bank will permit the borrower to maintain. A line of credit will charge interest as soon as money is borrowed, and like most loans, borrowers must be approved by the bank through an examination of the borrower's financial position, credit rating and/or relationship with the bank. Once the line of credit is established, the borrower can withdraw funds at any time, as long as the cash does not exceed the maximum set in the agreement.

Cash flow troubles can stem from poor financial planning, lack of good financial policies, non-compliance with such policies, poor collection of accounts receivable, inadequate fee increases, loss



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In a 2011 Veterinary Fraud Survey, 67.8% of veterinary practices had been the victim of fraud, theft or embezzleent.

of revenue, failure to capture whole revenue, erratic inventory management and theft or embezzlement. Each of these alone or in combination can be devastating to a practice.

Financial Planning

Financial planning includes having a yearly budget that projects your expected revenue and expenses for the next 12 months. Having annual and monthly totals can be of great help in managing the cash coming into the practice. If there are larger sums expected to be due in certain months for insurance, taxes or medication purchases, practice owners can reduce distributions if necessary to ensure adequate funds are available. A budget is easily prepared from the previous year's QuickBooks profit and loss statements, which can be exported to an Excel spreadsheet.

By thinking about how revenue and expenses are likely to change in the coming months, the practice owners can approximate what is likely to occur in the near future. Comparing the actual results to the budgeted amounts allows necessary adjustments or perhaps permits a larger owner profit distribution than anticipated.

Day-to-day operations require an uninterrupted supply of cash (capital). While the optimal thing to do is save enough money to weather these times, good planning includes obtaining a line of credit to provide a ready source of funding to keep a business running smoothly. Be sure to make an application for a line of credit while the practice is in a comfortable financial position in order to easily qualify for the credit.

Financial Policies

Some practices do not have written financial policies that specify how clients will be invoiced and their payments collected, but these are very important to develop and follow. Payment at the time of service is one of the most effective ways to ensure good cash flow because it avoids the accumulation of accounts receivable.

Each client should sign a written acknowledgment of the practice's financial policies. This paperwork also offers an opportunity to collect patient information, instructions in the event of an emergency when the client cannot be reached, and an authorization to safely store a credit card number and use it in paying for care.

Equine practices traditionally sent monthly invoices and collected the amounts due months to years later; that is a poor business practice. Veterinary practices are neither charities nor banks—they are valued, important community members that will cease to exist to serve their patients if they don't get paid in a timely fashion.

Non-compliance

Non-compliance with existing financial policies is quite common. Owners of practices are often the worst perpetrators. They might fail to collect on invoices that are due, give discounts or undermine the efforts of their staff to get bills paid in a timely way. Because associates don't have this leeway, clients might favor "old Doc" because they don't have to pay in full or on time, or maybe at all.

When practices have large amounts of accounts receivable aged over 90 days, non-compliance with policies is often the cause. Practice owners must "walk their talk" and "model the way" as good leaders.

Accounts Receivable

As costs rise for pharmaceuticals, wages,



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ANADA # 200-332, Approved by FDA

VET one®

Vetorphic™ C IV

(butorphanol tartrate injection)

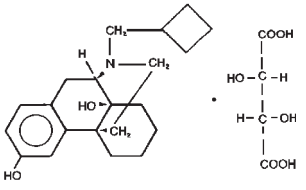
CAUTION

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

DESCRIPTION

Vetorphic™ (butorphanol tartrate) Injection is a totally synthetic centrally acting, narcotic agonist-antagonist analgesic with potent antitussive activity. It is a member of the phenanthrene series. The chemical name is Morphinan-3, 14-diol, 17-(cyclobutylmethyl)-,(-)-,(S-(R*,R*))-2,3-dihydroxy-butanedioate (1:1) (salt). It is a white, crystalline, water soluble substance having a molecular weight of 477.55; its molecular formula is C21H29NO2 • C4H6O6.

Chemical Structure:



Each mL of Vetorphic™ Injection contains butorphanol base (as butorphanol tartrate, USP) 10 mg, 3.3 mg citric acid, USP, 6.4 mg sodium citrate, USP, 4.7 mg sodium chloride, USP, and 0.1 mg benzethonium chloride, USP, q.s. with water for injection, USP.

CLINICAL PHARMACOLOGY

Comparative Pharmacology

In animals, butorphanol has been demonstrated to be 4 to 30 times more potent than morphine and pentazocine (Talwin®-V) respectively.[1] In humans, butorphanol has been shown to have 5 to 7 times the analgesic activity of morphine and 20 times that of pentazocine.[2,3] Butorphanol has 15 to 20 times the oral antitussive activity of codeine or dextromethorphan in dogs and guinea pigs.[4]

As an antagonist, butorphanol is approximately equivalent to nalorphine and 30 times more potent than pentazocine.[1]

Cardiopulmonary depressant effects are minimal after treatment with butorphanol as demonstrated in dogs,[5] humans[6,7] and horses.[8] Unlike classical narcotic agonist analgesics which are associated with decreases in blood pressure, reduction in heart rate, and concomitant release of histamine, butorphanol does not cause histamine release.[1] Furthermore, the cardiopulmonary effects of butorphanol are not distinctly dosage related but rather reach a ceiling effect beyond which further dosage increases result in relatively lesser effects.

Reproduction: Studies performed in mice and rabbits revealed no evidence of impaired fertility or harm to the fetus due to butorphanol tartrate. In the female rat, parenteral administration was associated with increased nervousness and decreased care for the newborn, resulting in a decreased survival rate of the newborn. This nervousness was seen only in the rat species.

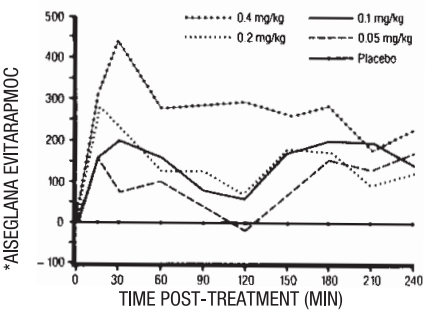
Equine Pharmacology

Following intravenous injection in horses, butorphanol is largely eliminated from the blood within 3 to 4 hours. The drug is extensively metabolized in the liver and excreted in the urine.

In ponies, butorphanol given intramuscularly at a dosage of 0.22 mg/kg was shown to alleviate experimentally induced visceral pain for about 4 hours.[9]

In horses, intravenous dosages of butorphanol ranging from 0.05 to 0.4 mg/kg were shown to be effective in alleviating visceral and superficial pain for at least four hours, as illustrated in the following figure:

Analgesic Effects of Butorphanol Given at Various Dosages in Horses with Abdominal Pain



*Pain threshold in butorphanol-treated colicky horses relative to placebo controls

A definite dosage-response relationship was detected in that butorphanol dosage of 0.1 mg/kg was more effective than 0.05 mg/kg but not different from 0.2 mg/kg in alleviating deep abdominal pain.

Acute Equine Studies

Rapid intravenous administration of butorphanol at a dosage of 2.0 mg/kg (20 times the recommended dosage) to a previously unmedicated horse resulted in a brief episode of inability to stand, muscle fasciculation, a convulsive seizure of 6 seconds duration, and recovery within three minutes. The same dosage administered after 10 successive daily 1.0 mg/kg dosages of butorphanol resulted only in transient sedative effects. During the 10 day course of administration at 1.0 mg/kg (10 times the recommended use level) in two horses, the only detectable drug effects were transient behavioral changes typical of narcotic agonist activity. These included muscle fasciculation about the head and neck, dysphoria, lateral nystagmus, ataxia, and salivation. Repeated administration of butorphanol at 1.0 mg/kg (10 times the recommended dose) every four hours for 48 hours caused constipation in one of two horses.

Subacute Equine Studies

Horses were found to tolerate butorphanol given intravenously at dosages of 0.1, 0.3, and 0.5 mg/kg every 4 hours for 48 hours followed by once daily injections for a total of 21 days. The only detectable drug effects were slight transient ataxia observed occasionally in the high dosage group. No clinical, laboratory, or gross or histopathologic evidence of any butorphanol-related toxicity was encountered in the horses.

INDICATIONS

Vetorphic™ (butorphanol tartrate) Injection is indicated for the relief of pain associated with colic in adult horses and yearlings. Clinical studies in the horse have shown that butorphanol tartrate alleviates abdominal pain associated with torsion, impaction, intussusception, spasmodic and tympanic colic, and postpartum pain.

WARNINGS

DO NOT USE IN HORSES INTENDED FOR HUMAN CONSUMPTION.

CAUTION

Vetorphic™ Injection, a potent analgesic, should be used with caution with other sedative or analgesic drugs as these are likely to produce additive effects.

There are no well-controlled studies using butorphanol in breeding horses, weanlings, and foals. Therefore, the drug should not be used in these groups.

ADVERSE REACTIONS

In clinical trials in horses, the most commonly observed side effect was slight ataxia which lasted 3 to 10 minutes. Marked ataxia was reported in 1.5% of the 327 horses treated. Mild sedation was reported in 9% of the horses.

DOSAGE

The recommended dosage in the horse is 0.1 mg of butorphanol per kilogram of body weight (0.05 mg/lb) by intravenous injection. This is equivalent to 5 mL of Vetorphic™ Injection for each 1000 lbs body weight. The dose may be repeated within 3 to 4 hours but treatment should not exceed 48 hours. Pre-clinical model studies and clinical field trials in horses demonstrate that the analgesic effects of butorphanol tartrate are seen within 15 minutes following injection and persist for about 4 hours.

HOW SUPPLIED

Vetorphic™ (butorphanol tartrate) Injection, 10 mg base activity per mL.

NDC 13985-703-20 20 mL vial in package of one

STORAGE

Store at controlled room temperature 20° to 25° C (68° to 77° F). Protect from light.

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VET one®

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MWB00N Rev. 02/20

VETone®

AnaSed® LA

(xylazine injection)

100 mg/mL

Sedative and Analgesic for Use in Horses and Cervidae (Fallow Deer, Mule Deer, Sika Deer, White-Tailed Deer and Elk)

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

Do not use in Cervidae less than 15 days before or during the hunting season.

DESCRIPTION: AnaSed® LA is supplied in 50 mL multiple-dose vials as a sterile solution.

EACH mL CONTAINS: Xylazine hydrochloride equivalent to 100 mg of base activity, methylparaben 0.9 mg, propylparaben 0.1 mg, sodium citrate dihydrate 5.0 mg and water for injection. pH adjusted with citric acid and sodium citrate.

INDICATIONS: Xylazine should be used in horses and Cervidae (Fallow Deer, Mule Deer, Sika Deer, White-Tailed Deer and Elk) when it is desirable to produce a state of sedation accompanied by a shorter period of analgesia.

Horses: Xylazine has been used successfully as follows:

1. Diagnostic procedures — oral and ophthalmic examinations, abdominal palpation, rectal palpation, vaginal examination, catheterization of the bladder and radiographic examinations.
2. Orthopedic procedures, such as application of casting materials and splints.
3. Dental procedures.
4. Minor surgical procedures of short duration such as debridement, removal of cutaneous neoplasms and suturing of lacerations.
5. To calm and facilitate handling of fractious animals.

Major surgical procedures:
a. When used as a preanesthetic to general anesthesia.
b. When used in conjunction with local anesthetics.

Cervidae: Xylazine may be used for the following:

1. To calm and facilitate handling of fractious animals.
2. Diagnostic procedures.
3. Minor surgical procedures.
4. Therapeutic medication for sedation and relief of pain following injury or surgery.
5. As a preanesthetic to local anesthesia, AnaSed® LA at the recommended dosages can be used in conjunction with local anesthetics, such as procaine or lidocaine.

DOSAGE AND ADMINISTRATION:

1. Dosage

Horses:
Intravenous — 0.5 mL/100 lb body weight (0.5 mg/lb or 1.1 mg/kg).
Intramuscular — 1.0 mL/100 lb body weight (1 mg/lb or 2.2 mg/kg).

Cervidae:
Administer intramuscularly, by either hand syringe or syringe dart, in the heavy muscles of the croup or shoulder.

Fallow Deer (*Dama dama*) — 2.0 to 4.0 mL/100 lbs body weight (2.0 to 4.0 mg/lb or 4.4 to 8.8 mg/kg).

Mule Deer (*Odocoileus hemionus*) — 1.0 to 2.0 mL/100 lbs body weight (1.0 to 2.0 mg/lb or 2.2 to 4.4 mg/kg).

Sika Deer (*Cervus nippon*) — 1.0 to 2.0 mL/100 lbs body weight (1.0 to 2.0 mg/lb or 2.2 to 4.4 mg/kg).

White-Tailed Deer (*Odocoileus virginianus*) — 1.0 to 2.0 mL/100 lbs body weight (1.0 to 2.0 mg/lb or 2.2 to 4.4 mg/kg).

Elk (*Cervus canadensis*) — 0.25 to 0.5 mL/100 lbs body weight (0.25 to 0.5 mg/lb or 0.55 to 1.1 mg/kg).

Following injection of xylazine, the animal should be allowed to rest quietly until the full effect has been reached.

These dosages produce sedation which is usually maintained for 1 to 2 hours, and analgesia which lasts for 15 to 30 minutes.

2. Preanesthetic to Local Anesthesia
Xylazine at the recommended dosages can be used in conjunction with local anesthetics, such as procaine or lidocaine.

3. Preanesthetic to General Anesthesia
Xylazine at the recommended dosage rates produces an additive effect to central nervous system depressants such as pentobarbital sodium, thiopental sodium and thiamylal sodium. Therefore, the dosage of such compounds should be reduced and administered to the desired effect. In general, only 1/3 to 1/2 of the calculated dosage of the barbiturates will be needed to produce a surgical plane of anesthesia. Post-anesthetic or emergence excitement has not been observed in animals preanesthetized with xylazine.

Xylazine has been used successfully as a preanesthetic agent for pentobarbital sodium, thiopental sodium, thiamylal sodium, nitrous oxide, ether, halothane, glyceryl guaiacolate and methoxyflurane anesthesia.

WARNING: This drug should not be administered to domestic food-producing animals.

Do not use in horses intended for human comsumption.

Avoid accidental administration to humans. Should such exposure occur, notify a physician immediately. Artificial respiration may be indicated.

In Cervidae, occasional capture-associated deaths occur. Clinical trials reveal a mortality rate of approximately 3.5% attendant with the administration of xylazine.

PRECAUTIONS: Careful consideration should be given before administering to horses and Cervidae with significantly depressed respiration, severe pathologic heart disease, advanced liver or kidney disease, severe endotoxic or traumatic shock and stress conditions such as extreme heat, cold, high altitude or fatigue.

Do not use xylazine in conjunction with tranquilizers.

Analgesic effect is variable, and depth should be carefully assayed prior to surgical/clinical procedures. Variability of analgesia occurs most frequently at the distal extremities of horses and Cervidae. **In spite of sedation, the practitioner and handlers should proceed with caution since defense reactions may not be diminished.**

Intracarotid Arterial Injection Should Be Avoided.

As with many compounds, including tranquilizers, immediate violent seizures followed by collapse may result from inadvertent administration into the carotid artery. Although the reaction with xylazine is usually transient and recovery may be rapid and complete, special care should be taken to assure that the needle is in the jugular vein rather than the carotid artery.

Horses: Since an additive effect results from the use of xylazine and the barbiturate compounds, it should be used with caution with these central nervous system depressants. Products known to produce respiratory depression or apnea, such as thiamylal sodium should be given at a reduced dosage and when injected intravenously, should be administered slowly. When intravenous administration is desired, avoid perivascular injection in order to achieve the desired effect. Studies have shown negligible evidence of tissue irritation, however, following perivascular injection of xylazine.

Bradycardia and an arrhythmia in the form of incomplete atrioventricular block have been reported following xylazine administration. Although clinically the importance of this effect is questioned,[1,2,3,4] a standard dose of atropine given prior to or following xylazine will greatly decrease the incidence.

Sedation for transport is most successful if actual transportation is begun after the full effect of the drug has been reached and the animal's stability is maintained while standing. In addition, it should be noted that animals under the influence of xylazine can be aroused by noise or other stimuli and this may increase the risk of injury.

Cervidae: It is preferable to administer AnaSed® LA to fasted Cervidae. As in all ruminants a safeguard against aspiration of food material into the lungs and/or bloat during deep sedation is necessary.

Care should be taken to administer AnaSed® LA in the heavy muscles of the croup or shoulder. Injections given subcutaneously, intraperitoneally or into fat deposits will give unpredictable results.

Cervidae should not be disturbed during induction or until the full effect of the drug has been reached which is usually 10 to 15 minutes following injection. The usual time to initial effect of the drug is 2 to 5 minutes. The administrator of the drug should be fully cognizant of this interval prior to administration of drug to free-ranging deer or elk, especially at night or in heavily wooded areas.

If the animal has been underdosed (faulty injection or miscalculation on weight) it is advisable to wait one hour before administering a second dose.

Adequate ventilation — especially in cages or crates is mandatory; keep head and neck in position to insure patent air passage and to prevent aspiration of stomach contents.

During sedation Cervidae should be prevented from assuming lateral recumbency. A sternal recumbent position is desirable.

While under the effects of xylazine, the animal should be protected from an extremely hot or cold environment.

Efforts should be made to prevent patient from rising until almost complete recovery is attained.

The transportation of Cervidae given AnaSed® LA should be carefully monitored to prevent excessive struggling, injury or death.

Hyperthermic reactions may occur, especially if the subject is in a highly excited psychic state when the drug is administered. Hosing the head and entire body with cold water has usually proven to be an effective deterrent.

Data are presently inadequate to recommend AnaSed® LA's use in pregnant Cervidae. Avoid use during breeding season.

Cervidae should be observed closely until all of the sedative effects of AnaSed® LA are gone.

Care should be taken at all times when administering AnaSed® LA to Cervidae. This is due to the method of administration (usually darting), the difficulty in estimating body weights and the accepted theory that wild animals are more unpredictable in their response to sedatives and analgesics than the domesticated species.

ADVERSE REACTIONS: Xylazine in horses and Cervidae used at recommended dosage levels may occasionally cause slight muscle tremors, bradycardia with partial A-V heart block and a reduced respiratory rate. Movement in response to sharp auditory stimuli may be observed. In horses, sweating, rarely profuse, has been reported following administration. In Cervidae, salivation, various vocalizations (bellowing, bleating, groaning, grunting, snoring) on expiration, audible grinding of molar teeth, protruding tongue and elevated temperatures have also been noted in some cases.

PHARMACOLOGY: Xylazine, a non-narcotic compound, is a sedative and analgesic as well as a muscle relaxant. Its sedative and analgesic activity is related to central nervous system depression. Its muscle-relaxant effect is based on inhibition of the intraneural transmission of impulses in the central nervous system. The principal pharmacological activities develop within 10 to 15 minutes after intramuscular injection in horses and Cervidae, and within 3 to 5 minutes following intravenous administration in horses.

A sleeplike state, the depth of which is dose-dependent, is usually maintained for 1 to 2 hours, while analgesia lasts from 15 to 30 minutes. The centrally acting muscle-relaxant effect causes relaxation of the skeletal musculature complementing sedation and analgesia.

In horses and Cervidae under the influence of xylazine, the respiratory rate is reduced as in natural sleep. Following treatment with xylazine, the heart rate is decreased and a transient change in the conductivity of the cardiac muscle may occur, as evidenced by a partial atrioventricular block. This resembles the atrioventricular block often observed in normal horses.[1,2,3,4] Although a partial A-V block may occasionally occur following intramuscular injection of xylazine, the incidence is less than when it is administered intravenously. Intravenous administration of xylazine causes a transient rise in blood pressure, followed by a slight decrease.

Xylazine has no effect on blood clotting time or other hematologic parameters.

SAFETY: Xylazine has been tested in horses at 5 times the recommended dose, and at doses above the recommended range in Cervidae. However, doses of this magnitude may produce convulsions and long periods of sedation in horses and muscle tremors and long periods of sedation in Cervidae.

STORAGE:
Protect from heat. Do not store over 30° C (86° F).

HOW SUPPLIED: NDC 13985-704-10 50 mL vial

NADA # 139-236, Approved by FDA

REFERENCES:

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gasoline and a practice's fixed operating costs, if revenues are due but not collected, it can become harder for the practice's accounts payable to be satisfied on time.

If clients have been accustomed to receiving invoices much later than the date that services for their horses were performed, they often have little sense of urgency in paying these bills. Accounts receivable at some level are unavoidable, but to maximize cash flow, they should be as low as possible. The best way to achieve this is to have a policy of payment at the time of service.

If big barns with lots of visits or absentee owners receive monthly invoices rather than paying at the time of service, each client should have a credit card on file with authorization to run the card if a check is not received within 10-20 days of the invoice date. Someone at the practice should monitor the Accounts Receivable on a regular basis and promptly follow up on all past due accounts.

Monies that are aged greater than 90 days are often uncollectible. Waiting until the work slows down at the end of the year and discovering that over half of the accounts receivable is over 90 days is an unpleasant shock requiring action. Being proactive beats reactive every time.

Inadequate Fee Increases

The reality is that costs generally rise every single year, with pharmaceutical costs rising 2-3% and fixed costs such as utilities, postage and insurance not far behind.

In order to maintain profitability, revenues must rise every year as well, but if this increase in production comes from increased hours of work or numbers of services, other costs for compensation and the materials used in providing the services will rise as well, eating up much of any potential increase in profit.

Instead, the uptick in revenue must come at least in part from raising fees every single year, even if it is a modest amount of 2-3%. If five or 10 years go by without a fee increase, the practice might have very little profit, struggle to pay adequate wages and have little money left for monthly bills, much less equipment purchases or raises. In that case, making necessary fee adjustments to bring the practice back into financial health will be large enough to generate concern and probable pushback from clients.

Rather than face this challenge, simply raise fees by at least 2.5% every six months, or 5% at the beginning of each year.

When inflation reaches 8% and gas prices are over $5 per gallon, a more robust price increase is indicated.



GETTY IMAGES

If your veterinary practice is busy and the clients are paying—but there still isn't good cash flow—it might be an indication of embezzlement.

Revenue Problems

When a practice loses associates, or a doctor is injured or retires, it can lead to a decrease in revenue if other veterinarians cannot pick up all the available work. If the expenses associated with employing that doctor fall sufficiently, and the revenue can be maintained, profit might actually rise. But more commonly there is a noticeable dip in revenue and profit when the workforce shrinks.

Since the practice's fixed expenses depend on a certain cash flow being earned each month, a practice owner might end up short of money to pay monthly bills.

Keeping a three-month emergency fund is good business. Maintaining disability insurance to replace wages in the event of injury is wise.

Another way revenue leaks away is through failure to capture all services and dispensed items on invoices, or from giving client discounts. These actions can cause serious deterioration to cash flow and should be strongly avoided.

Inventory Management

As the second-largest expense to a practice, the cost of inventory can challenge cash flow. Keeping a robust amount on the pharmacy shelves in order to avoid running out or being caught short in backorder situations can tie up large amounts of cash.

Before that inventory is invoiced to a client after being used for services or sold, the practice might need to pay the distributor that delivered the goods. Large distributor bills can accumulate, straining practice finances.

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ISTOCK

If veterinarians fail to collect on invoices at time of service or give discounts for any reason, the cost of those decisions affects the practice's bottom line.

Your inventory is valuable, so keep it locked up and count it regularly. The items to count most frequently are those that are expensive or easily sold if stolen (e.g., Adequan, Legend). Use a system to check off all inventory used in services or dispensed each day. This helps you restock and also assures you that these items land on an invoice. When inventory disappears or doesn't get paid for, cash flow will suffer.

Knowing the practice's "turn ratio" can help determine whether there is too much inventory. A practice should aim for eight to 12 turns a year, the equivalent of 30-45 days of inventory.

To figure your inventory turnover: Using your balance sheet from January 1 and December 31 of the same year, add the value of your inventory at the beginning of the year plus the value of your inventory at the end of the year and divide by two. This is your Average Inventory.

The total cost of yearly drug and medical supply purchases found on your end-of-year Profit and Loss Statement divided by the average inventory

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equals your inventory turn ratio.

To determine the days of inventory on hand, simply divide 365 days by inventory turns.

Theft or Embezzlement

Profitable practices can fail due to lack of cash if the owners drain profits for personal use and do not reinvest in the practice or leave enough for operating expenses. Typically, these practices must borrow money in order to operate, creating a practice with a heavy debt load and possible difficulties with repayment.

However, if practice owners are not taking excessive distributions, the practice is busy and the clients are paying—but there is not good cash flow—this might be an indication of embezzlement.

While you might believe that it is unlikely to impossible that an employee is stealing from you, it is sadly quite common.

In 2011, a Veterinary Fraud Survey was conducted by Dr. Marsha Heinke with 183 well-managed practice owner respondents. Of the practices surveyed, 67.8% had been the victim of fraud, theft or embezzlement. In 60.5% of incidents the fraudsters were identified but not prosecuted.

The average duration of fraud was 12.2 months, and 63.9% of fraudsters had been employed in the practice for three years or less.

(Find the fraud survey discussion here: www.veterinarypracticefraud.com/2011-02-16%20Fraud%20Survey%20E-Book.pdf.)

Systems and methods that reduce the chance of loss or embezzlement are called internal controls. They include all measures to ensure against errors, waste and fraud, whether accidental or deliberate.

There is inherent risk in having one person with all the responsibility for physical management of receipts of money, records of receipts and recording of payments in client accounts. No one person should handle all phases of a transaction from beginning to end. This is one of the best ways to deter embezzlement.

Take-Home Message

Having the ability to forecast the practice's cash flow in the coming year can be very helpful in managing practice finances. Over a few years, a practice owner can begin to make accurate projections as the seasonality of revenue and financial obligations are demonstrated.

Creating a chart of monthly cash inputs and outputs can be of great value in assessing financial health.

Managing cash flow is essential to maintaining a healthy practice. EM



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