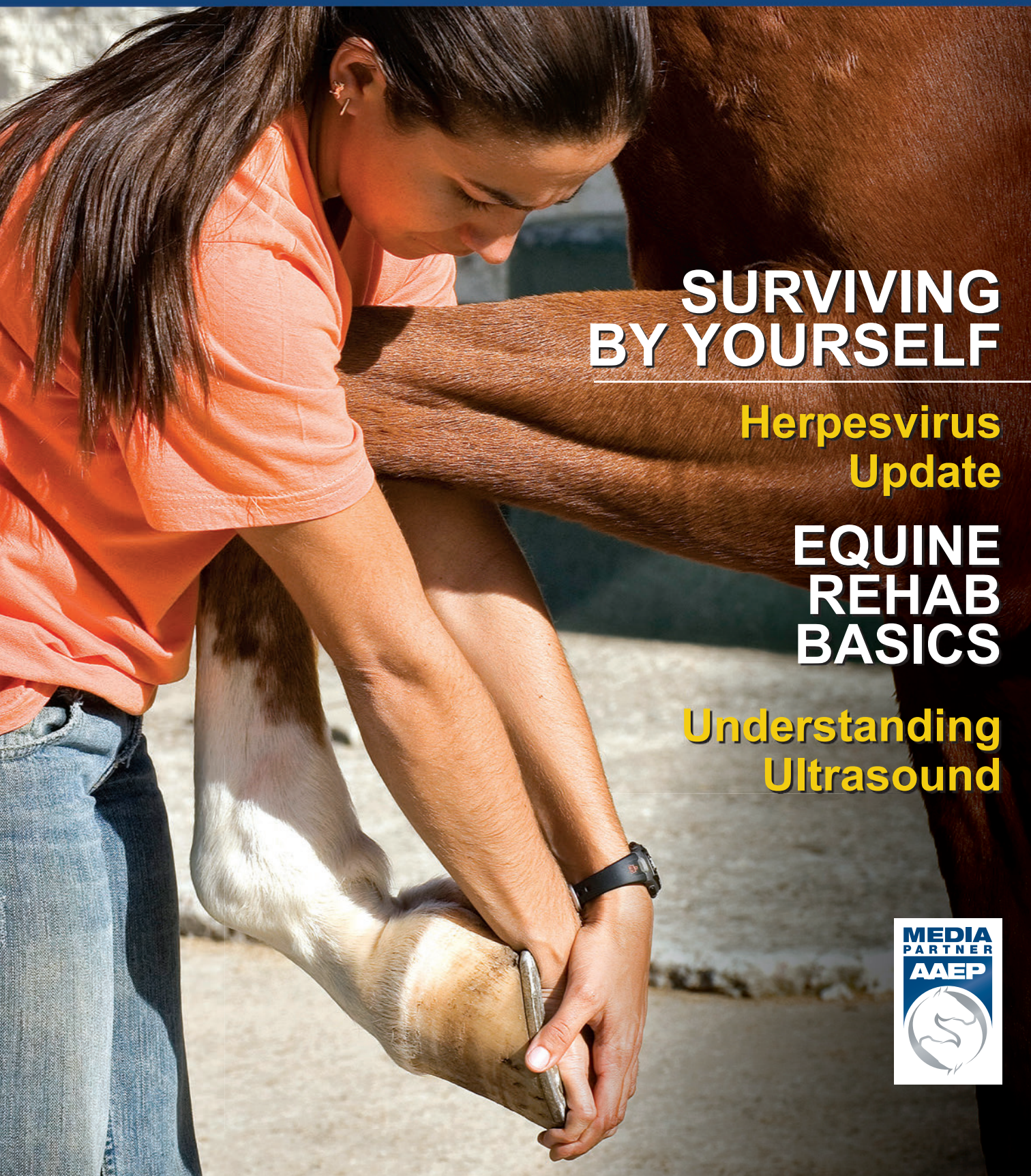
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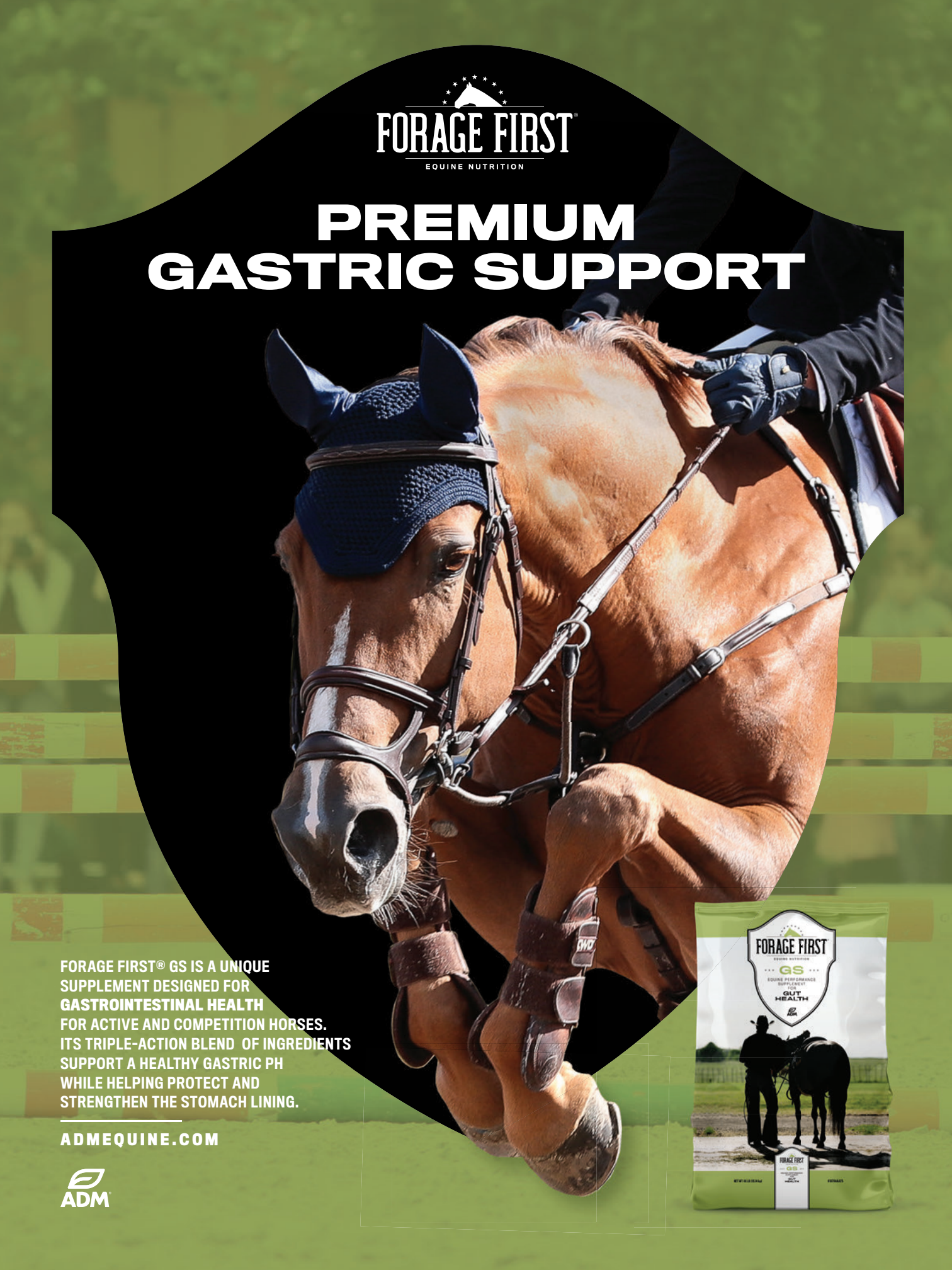
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Survival

By Kimberly S. Brown

"Survival" is a very emotional word. It brings to mind the struggle to simply exist in the face of overwhelming difficulties such as war, being lost in the wilderness or being faced with unexpected emotional or physical trauma. And in that word's simplest meaning, the equine veterinary industry is struggling for survival.

Our lead article actually uses that word: "When You Can't Find an Associate: Surviving By Yourself" on p. 22.

When did equine veterinarians enter this fight for survival, and what is the path out of the struggle?



The position in which the industry finds itself today has been coming for years, if not decades. Another "s" word has been bandied about recently: sacrifice. Today's younger veterinarians say they are not willing to "sacrifice" themselves on the "altar of equine veterinary medicine."

Yikes!

I know way too many equine veterinarians of my age (seniors or close to it) who have been divorced (sometimes multiple times), are estranged from their children, or who have been looking forward to retirement after a long life of sacrifice as an equine veterinarian only to find that no one wants the job!

At least no one wants the life that current veterinarians are living.

Working 60-100+ hours a week, day in and day out, does not provide enough time to balance your life with other things, such as family or personal interests (or sleep).

Not being able to plan uninterrupted time for a spouse or significant other, friends, children or activities has driven away the younger generation of vets.

Older veterinarians say members of the younger generation need to "pay their dues" with long hours and hard work. And if that was just an "entry fee" into the wonderful life of an experienced equine veterinarian, I don't think there would be a problem. But that is the description of the life of an equine vet year after year.

"No one on his deathbed ever said, 'I wish I had spent more time on my business.'"—*attributed to Arnold Zach*

In this issue, we have multiple articles aimed at helping equine veterinarians better manage the balance between work and non-work pursuits. "Business Briefs: Effective Emergency Communication" on p. 18, "Attracting the 'Right' Clients" on p. 46, "Staying True to Yourself" on p. 59 and "Avoiding Malpractice Complaints" on p. 76 are all steppingstones in re-building the new career known as "equine veterinarian."

Malpractice complaints? Yep. While incidents related to pre-purchase exams are the most common cause of equine claims seen by the AVMA Trust, the program routinely identified other situations as repeated sources of equine claims, complaints and lawsuits. These include consent and miscommunication issues, rectal tears, and complications related to anesthesia, sedation and castrations. Note that better communication ranks right up there with medical issues.

And it's not just in this print magazine that EquiManagement strives to help provide information and guidance from experts on work/life balance. Check out EquiManagement.com for articles, columns and podcasts that can help you understand your priorities, explain those priorities to your clients and set boundaries with those who depend on you for horse care. EM

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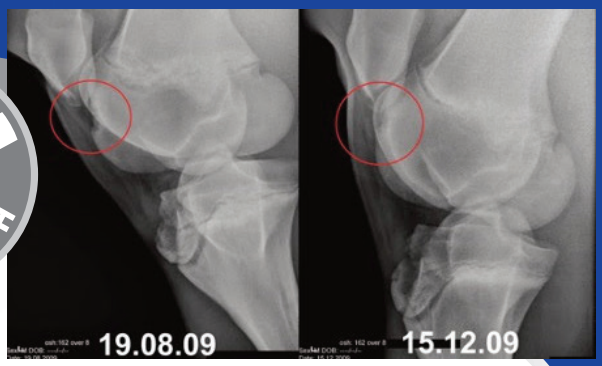
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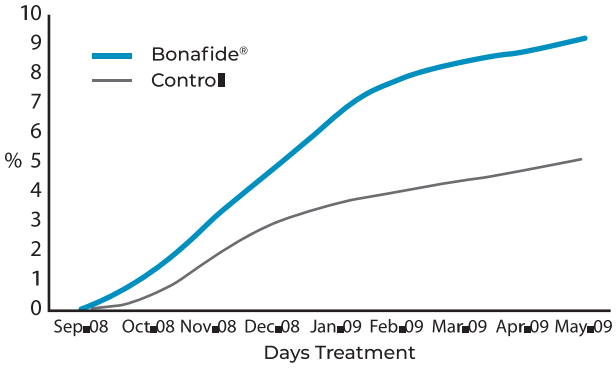


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By Nancy S. Loving, DVM

Biofilm in Wounds

Horses are notorious for getting injured, with leg wounds a common occurrence. Prompt attention and veterinary care usually resolve an injury with minimal problem. However, some wounds simply won't heal. In those cases, it is prudent to consider the presence of bacterial biofilms that help bacteria evade the horse's immune response and delay healing.

A Danish study evaluated a possible link between impaired healing and biofilms [Jorgensen, E.; Bjarnsholt, T.; and Jacobsen, S. Biofilm and Equine Limb Wounds. *Animals 2021*, 11, 2825; doi.org/10.3390/ani11102825]. The authors identified biofilm infection in nearly all equine limb wounds. They found that delayed healing due to biofilms tended to occur primarily on distal limb wounds rather than on body wounds.

The researchers noted that biofilms made bacteria less susceptible to antimicrobial drugs (AMDs) due to tolerance, which is different from genetically inherited AMD resistance. Tolerance needs time to develop, so biofilms only a couple of days old are more successfully treated with AMDs than biofilms of longer duration. Biofilms exert their adverse actions in multiple ways:

- Neutrophils release enzymes and oxidative radicals to significantly injure surrounding tissue.
- More collateral damage is incurred by antibodies that cannot bind to bacteria—instead, they form immune complexes that activate opsonization and the complement system.
- Oxygen consumed by biofilms and leukocytes lowers oxygen tension in the tissues.

All these instances amplify hypoxia and inflammation with increasing biofilm formation and collateral injury to the tissues. The result: a non-healing wound.

The incidence of occurrence also depends in part on the wound bed and its microenvironment.

It is difficult to identify biofilms with routine diagnostic tests or visual observation of typical signs of inflammation. Tissue biopsy and electron microscopy, PCR and culture might yield some information. Suspicion of a biofilm issue is likely for a non-healing limb wound on a horse. The authors noted that "systemic antibiotics have no effect on the bacterial burden in granulating wounds and should therefore mainly be used for acute wound infections."

Ideally, the objective is to prevent



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In wounds that won't heal, it is prudent for veterinarians to suspect the presence of bacterial biofilms.



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biofilm formation in the first place, and that can be accomplished by local and/or systemic treatment with AMDs in a wounded horse within the initial 24 hours.

Once a biofilm has become established, treatment relies on debridement—sharp dissection with a scalpel is one effective technique—as many times as necessary. Each debridement effort physically removes biofilm and bacteria, providing an additional 24-hour window until biofilms reform and reestablish. During that period, topical and/or systemic treatments are key to limiting bacterial growth and biofilm production.

Debridement at bandage change further helps with resolution, particularly if crevices exist in the wound. The authors had no preference for topical treatment, but they suggested favorable results using polyhexamethylene biguanide (PHMB), nanocrystalline silver or silver sulfadiazine, and antibiotics.

Another strategy is to apply hypertonic saline, sugar or honey for a few days to reduce the burden of organisms and help remove necrosis and exudates. For *Pseudomonas aeruginosa* infections, they recommended topical use of gauze-soaked 2% acetic acid for 20-30 minutes along with appropriate AMDs.

Ophthalmic Topical Corticosteroid Treatment

Equine recurrent uveitis (ERU) is often managed with topical corticosteroids to avoid unwanted consequences of systemic corticosteroids. A study evaluated penetration of two different steroid forms for topical use in the eye [Hermans, H.; van den Berg, E.M.H.; Slenter, I.J.M.; et al. Penetration of topically administered dexamethasone disodium phosphate and prednisolone acetate into the normal equine ocular fluids. *Equine Veterinary Journal* Oct 2021; DOI: 10.1111/evj.13526].

In the study, 21 Shetland ponies were treated that upon ocular examination were not suffering from anterior uveitis. Both eyes were treated every two hours for 24 hours to simulate an



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Topical steroid treatment in this study was found to be unrealistic in attempting to treat posterior uveitis in Shetland ponies.

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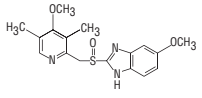
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Description

• Chemical name: 5-Methoxy-2-[[(4-methoxy-3,5-dimethyl-2-pyridinyl) methyl]sulfinyl]-1H-benzimidazole. Empirical formula: C17H19N3O3S. Molecular weight: 345.42. Structural formula:



How Supplied

• GastroGard (omeprazole) Paste for horses contains 37% w/w omeprazole and is available in an adjustable-dose syringe. Each syringe contains 2.28 g of omeprazole. Syringes are calibrated according to body weight and are available in boxes of 7 units or 72 units.

Storage Conditions

• Store at 68°F – 77°F (20-25°C). Excursions between 59°F – 86°F (15-30°C) are permitted.

Indications

• For treatment and prevention of recurrence of gastric ulcers in horses and foals 4 weeks of age and older.

Dosage Regimen

• For treatment of gastric ulcers, GastroGard Paste should be administered orally once-aday for 4 weeks at the recommended dosage of 1.8 mg omeprazole/lb body weight (4 mg/kg). For the prevention of recurrence of gastric ulcers, continue treatment for at least an additional 4 weeks by administering GastroGard Paste at the recommended daily maintenance dose of 0.9 mg/lb (2 mg/kg).

Directions For Use

• GastroGard Paste for horses is recommended for use in horses and foals 4 weeks of age and older. The contents of one syringe will dose a 1250 lb (568 kg) horse at the rate of 1.8 mg omeprazole/lb body weight (4 mg/kg). For treatment of gastric ulcers, each weightmarking on the syringe plunger will deliver sufficient omeprazole to treat 250 lb (114 kg)body weight. For prevention of recurrence of gastric ulcers, each weight marking will deliver sufficient omeprazole to dose 500 lb (227 kg) body weight.

• To deliver GastroGard Paste at the treatment dose rate of 1.8 mg omeprazole/lb body weight (4 mg/kg), set the syringe plunger to the appropriate weight marking according to the horse's weight in pounds.

• To deliver GastroGard Paste at the dose rate of 0.9 mg/lb (2 mg/kg) to prevent recurrence of ulcers, set the syringe plunger to the weight marking corresponding to half of the horse's weight in pounds.



• To set the syringe plunger:
1) While holding plunger, turn the knurled ring on the plunger ¼ turn to the left and slide the knurled ring along the plunger shaft so that the side nearest the barrel is at the appropriate weight marking, aligning the arrows on the ring and plunger as shown in the pictogram.
2) Lock the ring in place by making ¼ turn to the right. Ensure it is locked.

• Make sure the horse's mouth contains no feed. Remove the cover from the tip of the syringe, and insert the syringe into the horse's mouth at the interdental space. Depress the plunger until stopped by the knurled ring. The dose should be deposited on the back of the tongue or deep into the cheek pouch. Care should be taken to ensure that the horse consumes the complete dose. Treated animals should be observed briefly after administration to ensure that part of the dose is not lost or rejected. If any of the dose is lost, redosing is recommended.

• If, after dosing, the syringe is not completely empty, it may be reused on following days until emptied. Replace the cap after each use.

Warning

• Do not use in horses intended for human consumption. Keep this and all drugs out of the reach of children. In case of ingestion, contact a physician. Physicians may contact a poison control center for advice concerning accidental ingestion.

Adverse Reactions

• In efficacy trials, when the drug was administered at 1.8 mg omeprazole/lb (4 mg/kg) body weight daily for 28 days and 0.9 mg omeprazole/lb (2 mg/kg) body weight daily for 30 additional days, no adverse reactions were observed.

• To report suspected adverse drug events, for technical assistance, or to obtain a copy of the Safety Data Sheet (SDS), contact Boehringer Ingelheim Animal Health USA Inc. at 1-888-637-4251. 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.

Precautions

• The safety of GastroGard Paste has not been determined in pregnant or lactating mares

Clinical Pharmacology

• Mechanism of Action: Omeprazole is a gastric acid pump inhibitor that regulates the final step in hydrogen ion production and blocks gastric acid secretion regardless of the stimulus. Omeprazole irreversibly binds to the gastric parietal cell's H+, K+ ATPase enzyme which pumps hydrogen ions into the lumen of the stomach in exchange for potassium ions. Since omeprazole accumulates in the cell cannaliculi and is irreversibly bound to the effect site, the plasma concentration at steady state is not directly related to the amount that is bound to the enzyme. The relationship between omeprazole action and plasma concentration is a function of the rate-limiting process of H+, K+ ATPase activity/turnover. Once all of the enzyme becomes bound, acid secretion resumes only after new H+, K+ ATPase is synthesized in the parietal cell (i.e., the rate of new enzyme synthesis exceeds the rate of inhibition).

• **Pharmacodynamics:** In a study of pharmacodynamic effects using horses with gastric cannulae, secretion of gastric acid was inhibited in horses given 4 mg omeprazole/kg/day. After the expected maximum suppression of gastric acid secretion was reached (5 days), the actual secretion of gastric acid was reduced by 99%, 95% and 90% at 8, 16, and 24 hours, respectively.

• **Pharmacokinetics:** In a pharmacokinetic study involving thirteen healthy, mixed breed horses (8 female, 5 male) receiving multiple doses of omeprazole paste (1.8 mg/lb once daily for fifteen days) in either a fed or fasted state, there was no evidence of drug accumulation in the plasma when comparing the extent of systemic exposure (AUC0-∞). When comparing the individual bioavailability data (AUC0-∞ , Cmax, and Tmax measurements) across the study days, there was great inter- and intrasubject variability in the rate and extent of product absorption. Also, the extent of omeprazole absorption in horses was reduced by approximately 67% in the presence of food. This is evidenced by the observation that the mean AUC0-∞ values measured during the fifth day of omeprazole therapy when the animals were fasted for 24 hours was approximately three times greater than the AUC estimated after the first and fifteenth doses when the horses were fed hay ad libitum and sweet feed (grain) twice daily. Prandial status did not affect the rate of drug elimination. The terminal half-life estimates (N=38) ranged from approximately one-half to eight hours.

Efficacy

• **Dose Confirmation:** GastroGard (omeprazole) Paste, administered to provide omeprazole at 1.8 mg/lb (4 mg/kg) daily for 28 days, effectively healed or reduced the severity of gastric ulcers in 92% of omeprazole-treated horses. In comparison, 32% of controls exhibited healed or less severe ulcers. Horses enrolled in this study were healthy animals confirmed to have gastric ulcers by gastroscopy. Subsequent daily administration of GastroGard Paste to provide omeprazole at 0.9 mg/lb (2 mg/kg) for 30 days prevented recurrence of gastric ulcers in 84% of treated horses, whereas ulcers recurred or became more severe in horses removed from omeprazole treatment.

• **Clinical Field Trials:** GastroGard Paste administered at 1.8 mg/lb (4 mg/kg) daily for 28 days healed or reduced the severity of gastric ulcers in 99% of omeprazole-treated horses. In comparison, 32.4% of control horses had healed ulcers or ulcers which were reduced in severity. These trials included horses of various breeds and under different management conditions, and included horses in race or show training, pleasure horses, and foals as young as one month. Horses enrolled in the efficacy trials were healthy animals confirmed to have gastric ulcers by gastroscopy. In these field trials, horses readily accepted GastroGard Paste. There were no drug related adverse reactions. In the clinical trials, GastroGard Paste was used concomitantly with other therapies, which included: anthelmintics, antibiotics, non-steroidal and steroidal anti-inflammatory agents, diuretics, tranquilizers and vaccines.

• **Diagnostic and Management Considerations:** The following clinical signs may be associated with gastric ulceration in adult horses: inappetance or decreased appetite, recurrent colic, intermittent loose stools or chronic diarrhea, poor hair coat, poor body condition, or poor performance. Clinical signs in foals may include: bruxism (grinding of teeth), excessive salivation, colic, cranial abdominal tenderness, anorexia, diarrhea, sternal recumbency or weakness. A more accurate diagnosis of gastric ulceration in horses and foals may be made if ulcers are visualized directly by endoscopic examination of the gastric mucosa. Gastric ulcers may recur in horses if therapy to prevent recurrence is not administered after the initial treatment is completed. Use GastroGard Paste at 0.9 mg omeprazole/lb body weight (2 mg/kg) for control of gastric ulcers following treatment. The safety of administration of GastroGard Paste for longer than 91 days has not been determined. Maximal acid suppression occurs after three to five days of treatment with omeprazole.

Safety

• GastroGard Paste was well tolerated in the following controlled efficacy and safety studies.

• In field trials involving 139 horses, including foals as young as one month of age, no adverse reactions attributable to omeprazole treatment were noted.

• In a placebo controlled adult horse safety study, horses received 20 mg/kg/day omeprazole (5x the recommended dose) for 90 days. No treatment related adverse effects were observed.

• In a placebo controlled tolerance study, adult horses were treated with GastroGard Paste at a dosage of 40 mg/kg/day (10x the recommended dose) for 21 days. No treatment related adverse effects were observed.

• A placebo controlled foal safety study evaluated the safety of omeprazole at doses of 4, 12 or 20 mg/kg (1, 3 or 5x) once daily for 91 days. Foals ranged in age from 66 to 110 days at study initiation. Gamma glutamyltransferase (GGT) levels were significantly elevated in horses treated at exaggerated doses of 20 mg/kg (5x the recommended dose). Mean stomach to body weight ratio was higher for foals in the 3x and 5x groups than for controls; however, no abnormalities of the stomach were evident on histological examination.

Reproductive Safety

• In a male reproductive safety study, 10 stallions received GastroGard Paste at 12 mg/kg/day (3x the recommended dose) for 70 days. No treatment related adverse effects on semen quality or breeding behavior were observed. A safety study in breeding mares has not been conducted.

For More Information

• Please call 1-888-637-4251.

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aggressive treatment protocol for acute ERU. One eye was treated with 0.15 mg dexamethasone disodium phosphate (0.1%); the other eye was treated with 1.5 mg prednisolone acetate (1%). Under general anesthesia, samples were taken from aqueous and vitreous humor at multiple time points following the last dose—5, 15, 30, 60, 90, 120 and 180 minutes.

In aqueous humor in the anterior chamber, dexamethasone reached a concentration of 32.4 ng/ml and prednisolone at 321.6 ng/ml.

The authors stated that penetration of dexamethasone and prednisolone were not statistically different considering that the prednisolone medication has a 10-times-higher concentration than dexamethasone—1% vs 0.1%. Also, prednisolone contains drug particles within its suspension, and it use causes ocular discomfort in horses; it is important to shake it vigorously prior to treatment. To exert anti-inflammatory effects, dexamethasone needs a minimum concentration of 20-25 ng/ml.

While therapeutic concentrations were achieved in the anterior chamber by both medications, concentration of both corticosteroids were below the limit of detection in the vitreous and in serum samples, thus making topical ophthalmic corticosteroid treatment unrealistic for cases of posterior uveitis.

To manage posterior uveitis, other routes of corticosteroid administration are necessary—subconjunctival, peribulbar injection or systemic administration.

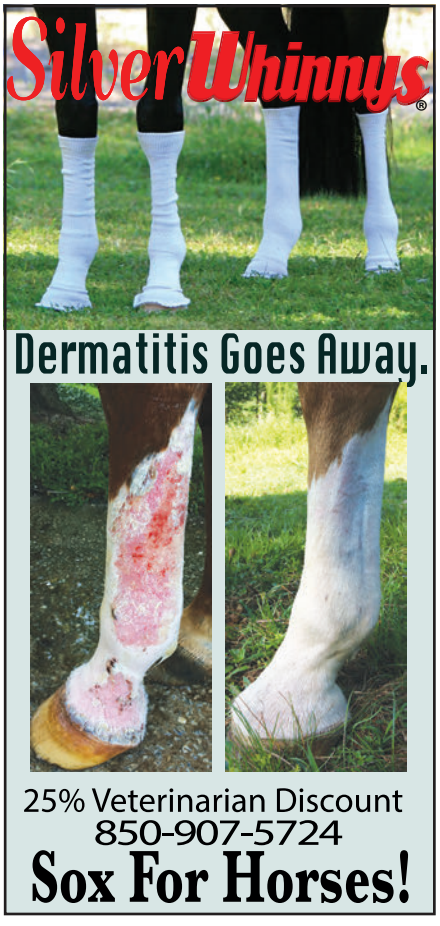
ACTH as a Biomarker for PPID

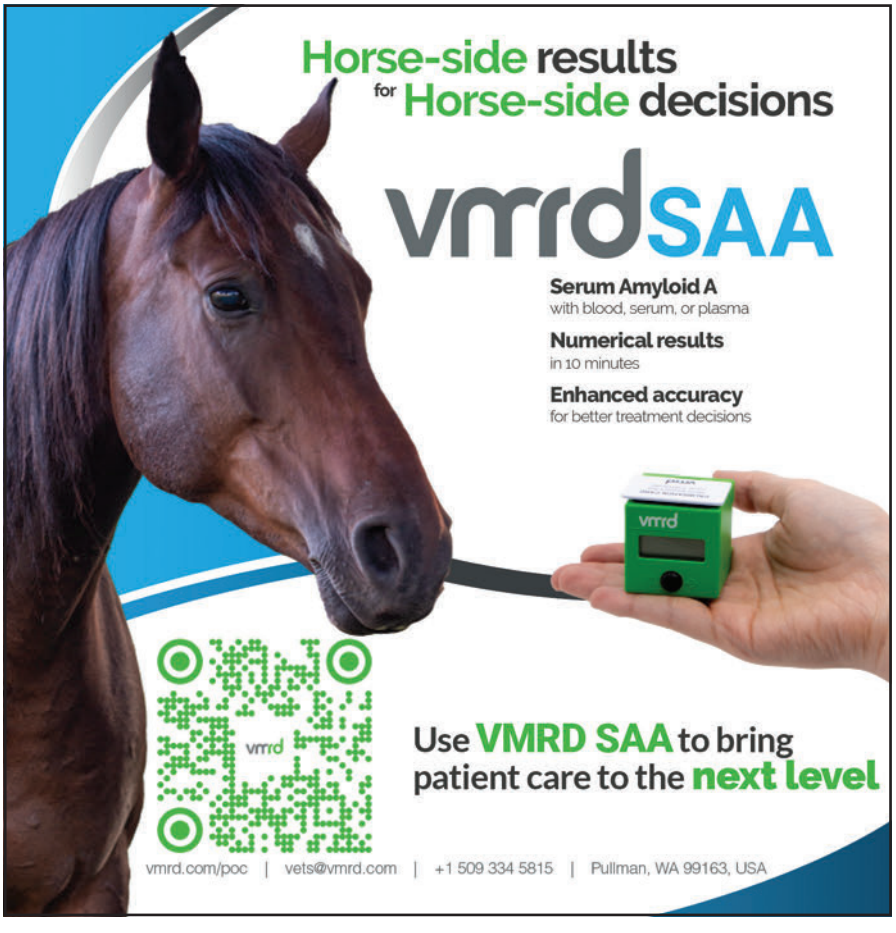
In many cases of pituitary pars intermedia dysfunction (PPID or Cushing's Disease), overt clinical signs point to dysfunction within the pituitary gland. In less demonstrative cases, blood testing is necessary to confirm a diagnosis.

A screening test evaluating baseline ACTH concentration is often used as a preliminary check on the hormonal status of a horse.

A study sought to identify the accuracy of using ACTH as a biomarker for PPID [Meyer, J.C.; Hunyadi, L.M.; Ordonez, J.M. The accuracy of ACTH as a biomarker for pituitary pars intermedia dysfunction in horses: A systematic review and meta-analysis. *Equine Veterinary Journal* Aug 2021; DOI: 10.1111/evj.13500].

Obtaining an accurate diagnosis is important to facilitate treatment of a horse with PPID with pergolide or to







ISTOCK

ACTH is not sufficient as a diagnostic test for PPID unless the horse has classical clinical signs.

eliminate unnecessary treatment. An ACTH level is suggested by the Equine Endocrinology group as a "rule-in" test for horses with clinical sign of PPID, particularly if those signs are moderate to advanced. In the absence of a positive ACTH test, then those horses are subjected to a TRH stimulation test.

This study extracted data from 752 adult horses or ponies to identify true-positives, false-positives, true-negatives and false-negatives. Those with PPID numbered 234 while 518 horses did not have PPID.

In summary, the authors conclude, "The evidence indicated that ACTH as a diagnostic test for PPID in the horse is not sufficient unless accompanied by classical clinical signs. ACTH should not be used as a screening test or as the sole diagnostic test in horses not exhibiting clinical signs of PPID."

Thryotropin-Releasing Hormone (TRH) Stimulation Test Repeatability

A more accurate means of diagnosing PPID is through the use of the TRH stimulation test to compensate for fluctuations in ACTH concentrations due to season, stress, exercise and disease. In general, baseline ACTH has an overall accuracy >90% with median sensitivity >75% and median specificity >75%. In autumn months, these parameters diminish and confound diagnosis.

A study looked at 20 adult horses segregated into specific groups and season tested: six controls and six horses with PPID tested in autumn; eight controls and six horses with PPID tested in winter; and three controls and three horses with PPID tested in both seasons [Kam, Y.N.; McKenzie, K.; Coyle, M.; Bertin, F.R. Repeatability of a thyrotropin-releasing hormone stimulation test for diagnosis of pituitary pars intermedia dysfunction in mature horses. *Journal of Veterinary Internal Medicine* Oct 2021; DOI: 10.1111/jvim.16281].

Testing on two occasions was done one week before and one week after the winter solstice and similarly around the autumn equinox.

A baseline blood sample was obtained, and another was taken 30 minutes after IV injection of 1 mg of TRH. Samples were sent to the lab for ACTH values.

The findings:

- In winter, the TRH stimulation test had an *excellent* test-retest reliability.
- In autumn, ACTH concentrations following TRH injection were lower on the second test, yet the test is considered to have a "good" test-retest reliability.

In conclusion, when performed two weeks apart around the winter solstice, the TRH stimulation test was repeatable. During the winter, the hypothalamic-pituitary axis is in a more quiescent phase with less variability in ACTH concentrations. However, in autumn months, testing around the autumn equinox results in greater variability in ACTH concentrations taken 30 minutes after TRH injection—this indicates that there is less test repeatability during that season.

Based on these findings, the authors reported: "Repeat testing in autumn might be less reliable when monitoring disease progression or response to treatment."

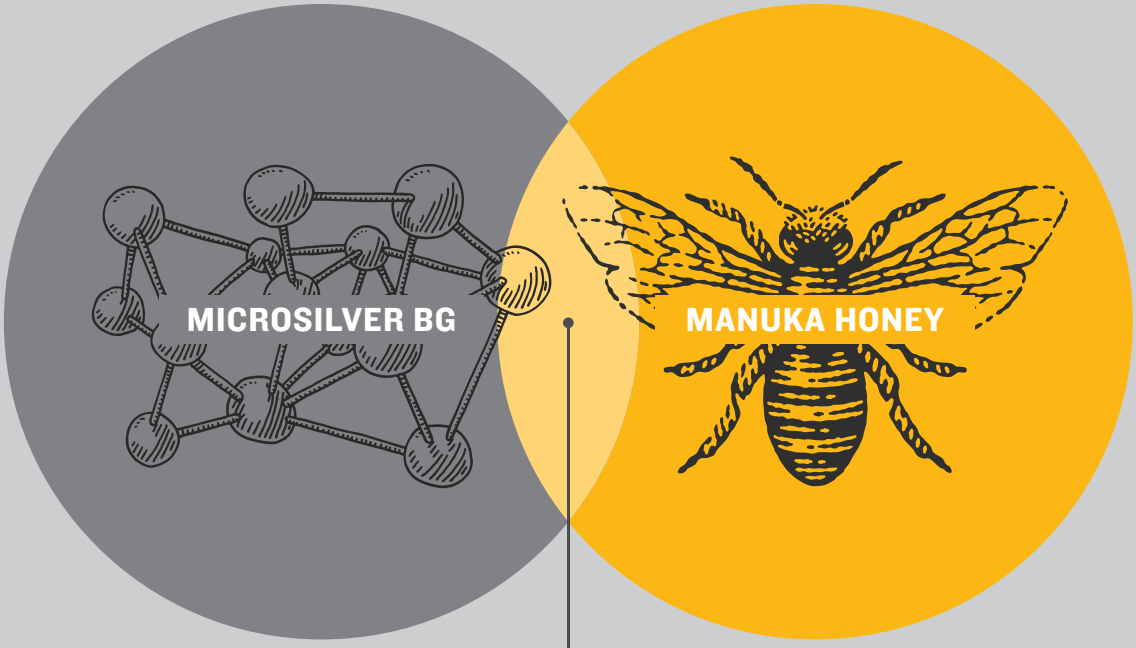
FEI Regulation Changes

In the *2022 Veterinary Regulations* manual, there are several relevant changes that are important for Veterinarians and Persons Responsible for the Horse to know about. One involves the use of the FEI HorseApp, which was developed to manage FEI Horses, including traceability features and monitoring of horse health at FEI Events [https://inside.fei.org/hub/it-services/mobile-apps/%20fei_horseapp].

Examination and Stabling Details:

- Ensure an FEI Equine Health Self-Certification form has been completed in the FEI HorseApp for each Horse entering the FEI Stables Area and that the Horse's rectal temperature has been recorded in the FEI HorseApp twice daily for 3 days prior to the Horse's arrival at the Event.
- Ensure that the Horse does not have any clinical signs of infectious disease. The Horse's rectal temperature must be taken twice daily and recorded in the FEI HorseApp. Their veterinarian may include a clinical examination to assess the heart, respiratory rate and the checking of any other clinical parameters.

FEI rules in regard to hair clipping on the competing horse's limbs and/or muzzle whisker or eye hair removal practices, infractions incur a penalty of



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EQUISUL-SDT®

(Sulfadiaz ne/Trimethoprim) Oral Suspension

For use in horses only.

Approved by FDA under NADA # 141-360

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

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

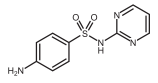
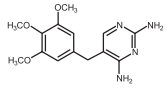


Figure 2. Structure of trimethoprim



Each mL of EQUISUL-SDT contains 400 mg combined active ingredients (333 mg sulfadiazine and 67 mg trimethoprim) in an aqueous suspension.

INDICATION
EQUISUL-SDT is indicated for the treatment of lower respiratory tract infections in horses caused by susceptible strains of *Streptococcus equi* subsp. *zooepidemicus*.

DOSAGE AND ADMINISTRATION

Shake well before use.

Administer EQUISUL-SDT 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.

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	Sulfadiaz ne	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.

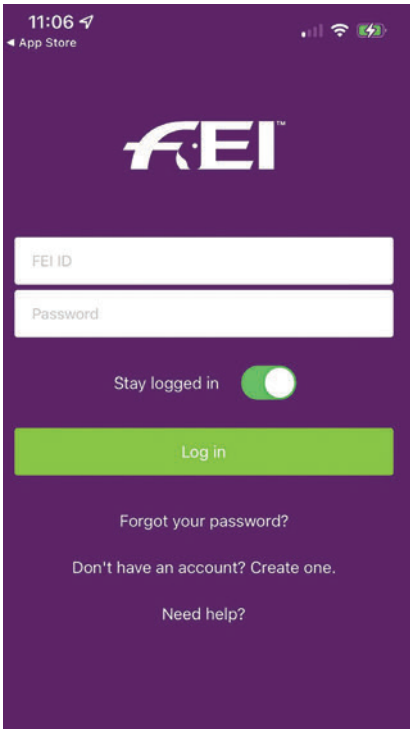
HOW SUPPLIED
EQUISUL-SDT is available in the following package sizes:
135 mL
280 mL
560 mL
900 mL

[footnote]

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

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The FEI HorseApp was developed to manage FEI horses.

disqualification from the Event:

- If the hair on the limbs has been clipped and/or shaven at any point during the Period of the Event, permission must be granted from the VC/VD by the PTV for clipping and/or shaving required for veterinary purposes, prior to any investigation or treatment taking place. Horses' limbs may be clipped up to 3 days before the Horse Inspection using a blade that cuts the hairs no shorter than 2mm; and
- If the Horse's sensory hairs have been clipped and/or shaven or in any other way removed unless individual sensory hairs have been removed by a veterinarian to prevent pain or discomfort for the Horse. Areas of hair that must be clipped, shaven or removed to allow veterinary treatment are exempt from this rule.
- Hair inside the ears can still be clipped as it is not considered sensory. EM





Andy Roberts, DVM
Lexington, KY

"EQUISUL-SDT® is my first course broad spectrum antibiotic. Because the combination of Sulfadiazine/ Trimethoprim is so broad spectrum, I don't have to worry about a quick culture result before prescribing the antibiotic. EQUISUL-SDT® is mainly used for respiratory issues, i.e., a febrile horse, elevated SAA, no cough and making a presumptive diagnosis that they have an early respiratory issue. I want a horse on this product a minimum of 10 days. With the convenient 560 mL bottles, I can script it out to a trainer/owner for 10 days."



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EQUISUL-SDT® (Sulfadiazine/Trimethoprim) Building a **Strong Defense** Against Lower Respiratory Tract Infections

Get your horse back in the game.
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Take control of joint and lameness issues

With an innovative non-surgical, non-drug veterinary medical device, horses may enjoy a better quality of life and remain active longer.

Lameness issues, joint pain and osteoarthritis. They're painful. They're frustrating. And they're extremely common. In fact, the chronic, progressive degeneration of the cartilage is believed to be responsible for up to 60% of all equine lameness.[1] The related economic impact is substantial, with annual costs estimated as high as $1 billion per year in the United States alone.[2]

Limitations of current treatments

Despite vast, ongoing research efforts, a cure for lameness issues continues to elude researchers. Veterinarians don't have a universal solution to turn to and lean on pain and inflammation symptom management through combinations of conventional therapies such as non-steroidal anti-inflammatory drugs (NSAIDs), intra-articular corticosteroids and nutraceuticals.

Along with inconsistent results and the inability to stop disease progression, each of these therapies carries with it unique drawbacks. Lameness issues are chronic and require ongoing treatment. Long-term use of NSAIDs comes with potential serious side effects, including the risk of ulcers, kidney damage and colic. And while corticosteroid injections are well documented to alleviate pain, overuse of certain steroids may actually be further damaging to the joint they're attempting to protect.

Fortunately, there is an innovative veterinary medical device available that goes beyond symptom management to help address lameness issues.

Introducing Spryng™ with OsteoCushion™ Technology: an innovative first line of defense

Spryng™ with OsteoCushion™ Technology is an innovative veterinary device that takes the management of lameness issues into a new arena by addressing the root cause of the conditions — missing and damaged cartilage.

Each Spryng™ intra-articular injection supplies a shock-absorbing matrix with natural fluid biomechanics that work together with synovial fluid to mimic joint cartilage in both form and function. When a horse jumps, runs or performs any movement with joint impact, the Spryng™ matrix's spongy, cushioning action absorbs and releases synovial fluid in response.

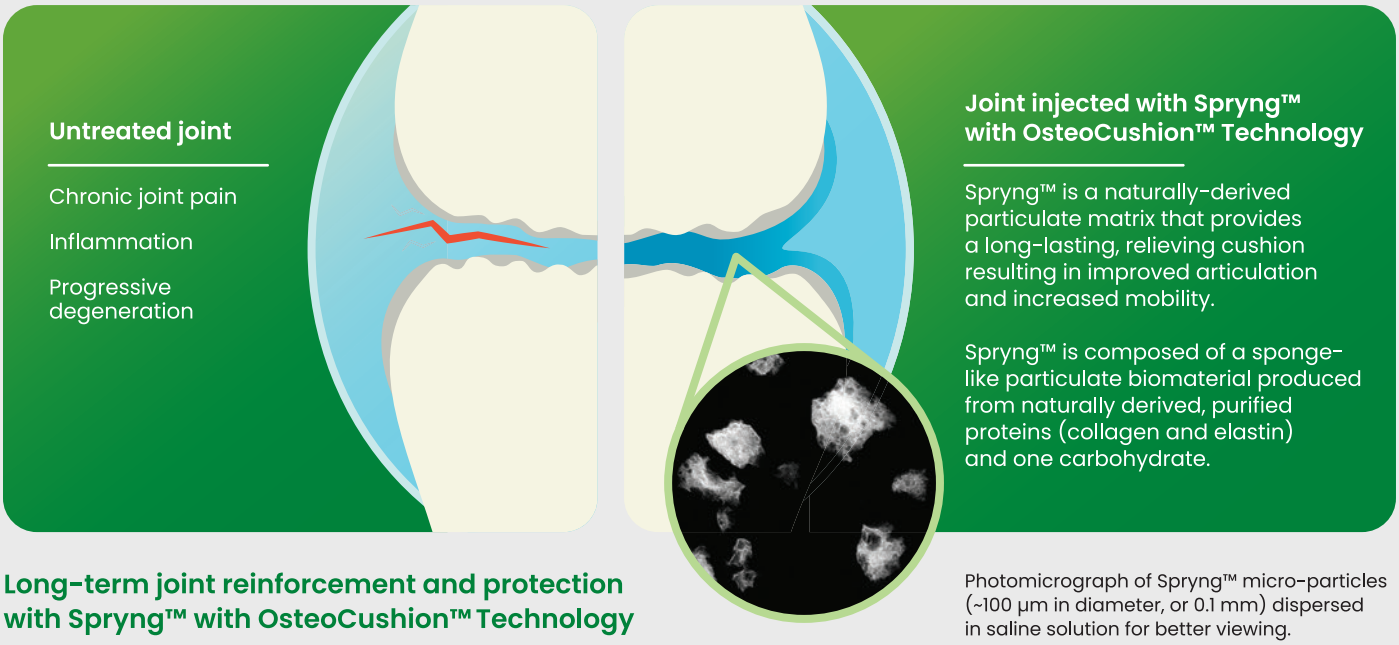
Spryng™ also provides a natural scaffold, potentially protecting the joint from further injury, unlike other lameness management options that may only mask pain or treat symptoms.

An effective injectable device solution

While the effects of a Spryng™ with OsteoCushion™ Technology injection are rapid — with most horses returning to normal daily activities, high impact sports, competitive events and training — they provide long duration of protection.

Upon injection into the affected joint, the naturally-derived, inert, precisely-sized matrix particles readily integrate with joint fluid and conform to synovial space. These micro-particles do not readily dissolve, are resistant to interstitial proteases, and are too large to pass through the pores of the synovium, thus providing long-duration joint protection after a single application.

In fact, unlike conventional treatments that require repeated injections or ongoing administration, one Spryng™ injection may provide relief for more than 12 months, making it an effective and



Long-term joint reinforcement and protection with Spryng™ with OsteoCushion™ Technology

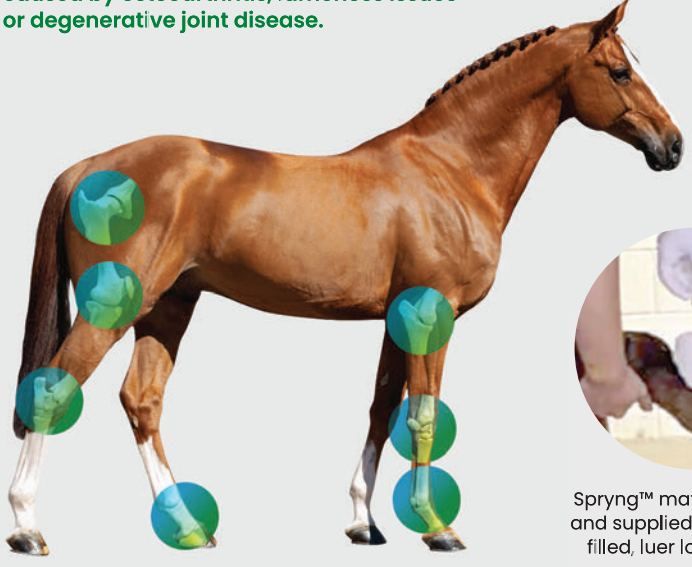
Photomicrograph of Spryng™ micro-particles (~100 µm in diameter, or 0.1 mm) dispersed in saline solution for better viewing.

economical solution for managing osteoarthritis, lameness issues and joint-related conditions.

Without negative side effects

While some intra-articular injectables present serious drawbacks, Spryng™ with OsteoCushion™ Technology is a naturally-derived biomaterial and functions without pharma-cologic, chemical or metabolic action. It has an excellent safety profile demonstrated in humans, laboratory animals, horses and dogs. Case studies collected over five years have provided positive testimonials from many veterinarians, and little to no adverse effects or interactions have been observed other than some mild, short-term injection-site swelling.

Spryng™ with OsteoCushion™ Technology aids in the management of joint pain from the loss of cartilage or structural changes caused by osteoarthritis, lameness issues or degenerative joint disease.





Spryng™ material is sterile and supplied in aseptically filled, luer lock syringes.

Addressing lameness issues, not masking symptoms

After a Spryng™ with OsteoCushion™ Technology injection, in many cases, study animals no longer needed NSAIDS for pain relief — with most horses returning to normal daily activities, high impact sports, competitive events and training. This contributes to reducing inflammation, greater joint health and a slowing of the progression of lameness issues, joint degeneration and osteoarthritis.

There may be no cure for lameness issues, but management with Spryng™ could be the key to getting an animal back up and running.

To learn more, visit SpryngHealth.com

To order, contact info1@petvivo.com or 844-PET-VIVO (844-738-8486)

spryng™
with OsteoCushion™ Technology

Spryng™ with OsteoCushion™ Technology is a veterinary medical device by **PetVivo, Inc.**

1. Orth MW, Schlueter AE. Equine osteoarthritis: a brief review of the disease and its causes. Equine Comp Exerc Physiol (2004) 1:221–31. doi: 10.1079/ecp200428
2. Keegan KG. Evidence-based lameness detection and quantification. Vet Clin North Am Equine Pract (2007) 23:403–23. doi:10.1016/j.cveq.2007.04.008

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By Amy L. Grice, VMD, MBA

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Effective Emergency Communication

Communicating with clients during an emergency situation requires leadership. Often emotions are high as clients might be worried about a number of issues: Is my horse going to die? What's all this going to cost? Will he ever be rideable again? Is he suffering? Is this my fault? With all of this chatter inside their heads, some clients will have trouble attending to your words. It helps to make eye contact, slow the cadence of your speech and say their names. "Betsy! Look at me for a moment. I know you are very worried about Blaze, and I need you to listen carefully so you understand what we need to do to help him."

Utilizing the four essential elements of good communication can help. They are non-verbal communication, open-ended questions, reflective listening and empathy.

Non-verbal communication makes up 80-90% of what we understand from others. The tone and volume of a person's voice, the positioning of their arms and hands, their posture, and their degree of eye contact tells the listener a lot about their state of mind. When the words that are spoken don't match the non-verbal signals, the result can be disharmony and a lack of trust. If the veterinarian says in a shaky voice with shaking hands, "Everything is going to be fine," there's a good chance the client won't believe it.

Noting the horse owner's non-verbal communication signals can also help you tailor your communication to be more effective. An angry man with crossed arms that is arguing about your diagnosis or treatment plan might need empathy and an opportunity to ask questions. "Tom, I know Coyote's fractured coffin bone is not what you expected, and how disappointed you must be about missing finals. What questions can I answer for you?" might be a good approach.



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When getting a history, open-ended questions can allow you to receive more useful information than those that just require a "yes" or "no" answer. Use questions like "What made you concerned about Blackie tonight?" or "How do you think the accident happened?" It might be best to avoid using "why" because this question can cause defensiveness and guilt, as it might seem to assign blame.

To prevent you from making wrong assumptions, use reflective listening.

"So, you saw Trigger get his leg caught in the bucket right before he became lame … is that right?" "Oh no, Doc! I didn't see him, but the bucket was torn off the fence, and he's lame, so that must be what happened, right?"

When you repeat what you heard in your own words and ask for clarification, it can be amazing what the owner missed telling you or what you misinterpreted. You can begin these statements with "What I hear you saying is …" or "Do I understand correctly that …"

Communicating with empathy is perhaps the most important piece in an emergency situation. It really means speaking to the emotions aroused by an unexpected, perhaps frightening, event. Showing empathy doesn't take much time, and it significantly increases rapport and client satisfaction. Statements that acknowledge the difficult emotions can validate the client's unease and help him or her feel heard. "I can see how much you care about Pumpkin. Have you had her a long time?"

Some of the best communication recommendations come from familiar words of advice: "People don't care how much you know until they know how much you care" and "People don't always remember what you said, but they always remember how you made them feel." EM

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PI on Page 85

ANALGESIA

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ARND BRONKHORST PHOTOGRAPHY

How do you cope if you are left to handle an increased workload without help?

When You Can't Find an Associate: Surviving by Yourself

Equine practice can be whatever you create; you can choose how to work in the equine veterinary industry.

By Amy L. Grice, VMD, MBA

Many practices that need associates to help with a growing workload have been unable to hire anyone. Other practices have experienced the departure of one or more of their employed veterinarians and have been unable to replace them.

In a recent survey of equine practitioners, 57% said their practices had experienced some or a great deal of difficulty in the last two years with hiring and/or retaining veterinarians. Some commented that they had not received a single application for their open positions. About two-thirds reported an increase in the number of new clients, the number of appointments and the number of hours worked compared to the previous year. Almost half reported seeing more emergencies. The AVMA reported that in 2021 there were 18.6 positions per veterinarian jobseeker across the veterinary profession. Clearly, across the industry, competition for veterinarians is intense.

So how can you cope if you are left to handle an increased load without the reinforcements you are used to or need due to growth in your practice?

One of the first things to acknowledge is that you won't be able to do the work of two or three veterinarians as a single person. Whether you have a solo practice or have partners, when the workload





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ISTOCK/HORSE FAMILY

While you might be making more money with the increased demand for equine veterinary services, it can take a toll on your well-being.

must be handled by fewer people, everyone will feel the burden.

Owners who retired years ago from any emergency duty will likely find themselves assuming this burden again. Routine work that had been transferred to newer associates to allow the senior veterinarian more time for the comprehensive services they preferred could find its way back onto the senior veterinarian's schedule. It is a difficult position to be in as a practice owner or as an associate. With fewer hands to do increased work, everyone must increase their efficiency and flexibility.

Financial Implications

Most equine veterinarians have seen brisk revenue growth since early 2020, primarily from increased work rather than increased prices. With a reduced workforce, the pressure of this growth can be intense. It is important to realize that an individual is physically and mentally able to do the work of more than one veterinarian for only a very limited time. If additional demands are made to existing associates' workload, they might choose other opportunities.

The financial implications of the loss of an associate are a source of worry for practice owners, but the additional workload to be shouldered is a bigger problem. Maintaining clients for the time in the future when another associate is found is important to many practice owners. However, being realistic is essential.

Average starting salaries for companion animal positions for new graduates without an internship were reported at $93,000 for both genders in 2020. These positions are typically for a four-day work week totaling 40 hours or less, with no emergency duty requirement.

By contrast, equine positions earned an average of $75,000 for males and $56,000 for females. There are 56 hours/week worked by the average equine practitioner of either gender. Emergency on-call responsibilities are the rule rather than the exception. With more than 80% of new graduates now female and in their prime child-bearing years, it is no surprise that the more family-friendly small animal positions are chosen by many veterinarians.

Attracting Associates

In order to attract an associate, an equine practice needs to clearly demonstrate flexibility, family-friendly cultures, shorter work weeks, better boundaries, strong support and mentoring for new graduates, competitive salaries and robust benefits.

Shared emergency duty is a must. Employer educational debt contributions are a very popular benefit. Signing bonuses are common in the companion animal sector, so should be considered.

Often these changes are difficult for practices that have been client-centric and hard-driving for decades. Practice owners often struggle to balance the finances necessary to adapt to changed times.

Raising Fees

Raising fees is one of the most effective methods to increase revenue sufficiently to afford the changes needed to attract an associate. With a decreased supply of equine veterinarians and an increased demand for services, basic economic principles support higher prices. Horse owners are typically not sensitive to price if they receive high value for services they care most about—lameness diagnosis, care of sick animals and emergency visits. Horse ownership is costly, and more than 50% of owners have annual incomes greater than $100,000. Dog and cat owners typically pay much more for their pets' veterinary care than equine owners, despite the huge difference in size of the species.

Increasing the cost of care might reduce the number of clients, but not as much as you might think. The price elasticity of demand (the effect a change in price will have on the quantity of demand) ratio is generally inelastic in veterinary medicine, meaning that it is less than 1. So, increases in price do not lead to an identical decrease in demand.

Although there are no current price elasticity figures for equine veterinary medicine, it is clear that horse owners have plenty of funds for purchasing the non-veterinary services, so they are likely to be able and willing to absorb

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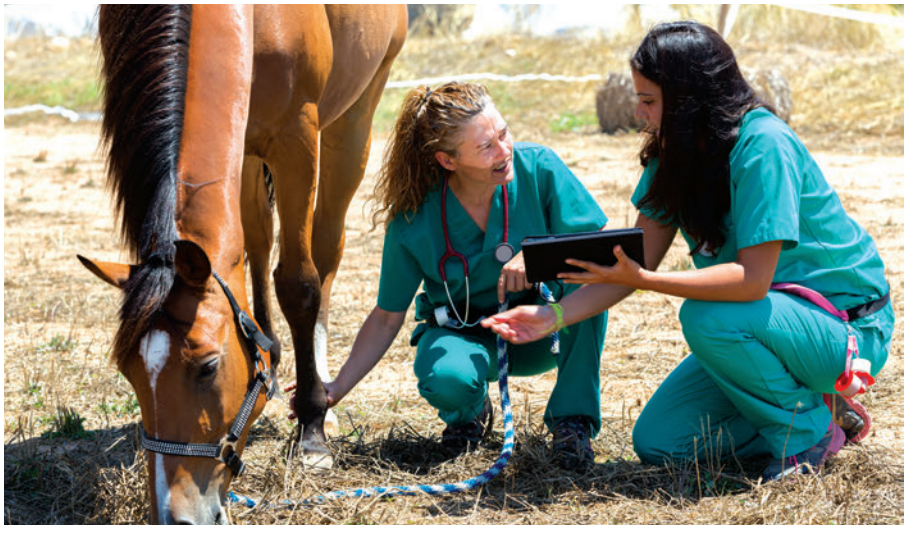
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Fully utilizing veterinary technicians can bring in revenue as well as increase the technicians' job satisfaction and the vet's well-being.

higher veterinary fees if they appreciate the value of those services.

For clients who are financially less fortunate, offering a spectrum of care options along with access to payment choices through a service like CareCredit can ease your moral concerns. Some of those options might include alternative methods of providing care.

Telemedicine

Using virtual methods to assess and triage patients can be a timesaver and is appreciated by clients, especially if they can avoid a visit, get their questions answered and have their concerns assuaged.

Telemedicine became much more common during the pandemic, both in human and veterinary medicine. What differs between the two branches of medicine is the fee structure. Almost 80% of equine veterinarians, according to a recent study, charge nothing for telemedicine. With a limited number of hours in the day, giving away your time for telemedicine consults reduces your earning capacity.

While it might not be necessary to charge for a two-minute conversation, it behooves you to recognize that each hour of your working day has a minimum amount that you must earn in order to pay your fixed expenses and salaries, as well as accumulate your profit goal. If you calculate that amount to be $240 per hour, each minute you should be earning (charging) $4. That translates to $40 for a 10-minute telemedicine consult.

Telemedicine encompasses assessing patients by text, video, photographs, Zoom meetings or other means. For a client with a new problem with a horse that he or she is unsure needs an examination, the usual approach has been to schedule an urgent appointment to determine the nature of the condition and the necessary intervention in-person. Instead, some veterinarians utilize technology to collect a history, ask questions and examine the patient visually.

In the case of a superficial scrape to the fleshy part of the body, an owner's concerns can be alleviated, treatment prescribed and a significant amount of time saved, while still earning income for the veterinarian's professional knowledge.

When time to meet clients' needs is limited, embracing technology can satisfy clients while conserving precious minutes. Charging for that time is essential, however. If you choose not to charge for telemedicine, you need to raise your fees for other services sufficiently to account for the time you give away.

Utilize Techs and Assistants

Another option for providing care by alternative means is to fully utilize any licensed technicians that you employ. Enlarging their duties can bring in revenue as well as increase their job satisfaction.

Many experienced technicians are capable of going on appointments independently for services such as bandage changes, suture removal or extracorporeal shock wave treatments. Drawing blood for recheck diagnostics or giving vaccines are other tasks they can do.

The increased use of physicians' assistants in human medicine is a good example of efficient use of resources. Client education in human medicine is greatly enhanced with the use of a PA. Because a PA's time is billed at a lower rate than an MD's time, the PA can spend more time with patients, answering questions and insuring understanding. While traditionally these tasks have been a way for new associates to be introduced to clients and build trusting relationships, there is financial opportunity in providing these services in a less costly way to the practice.

Utilization of technicians or assistants is not limited to sending them out independently. The efficiency gained by having one or even two assistants in each ambulatory truck is remarkable.

If doing multiple lameness exams at a barn, one assistant can be setting up or taking digital radiographs while the other scrubs for a joint injection or diagnostic block. Or one can be creating the medical record or invoice on the laptop while the other jogs the horse off after blocking.

An assistant can do the driving, allowing the veterinarian to concentrate on making callbacks, writing records or

Nutritional supplements for specific conditions

Condition	Product	Support
Cushing's/EMS	InsulinWise®	Healthy insulin regulation
Diarrhea/FFW	ProbioticWise®	Return to normal gut function
EPM/Lyme	Elevate® vitamin E	Normal nerve and muscle functions
Gastric/colonic ulcers	Neigh-Lox® Advanced	Normal pH levels, tissue healing, healthy microbiome
DOD/stress fractures	BoneWise®	Normal bone turnover and density
RER/PSSM	Elevate® vitamin E	Healthy muscle function, robust antioxidant levels



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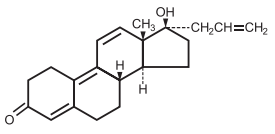
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Altren®
(altrenogest)
SOLUTION 0.22% (2.2 mg/mL)

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

DESCRIPTION:
Altren® (altrenogest) Solution 0.22% contains the active synthetic progestin, altrenogest. The chemical name is 17α-allyl-17β-hydroxyestra-4,9,11-trien-3-one. The CAS Registry Number is 850-52-2. The chemical structure is:



Each mL of Altren® (altrenogest) Solution 0.22% contains 2.2 mg of altrenogest in an oil solution.

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.

REFERENCES:
Shoemaker, C.F., E.L. Squires, and R.K. Shideler, 1989.

Safety of Altrenogest in Pregnant Mares and on Health and Development of Offspring. Eq. Vet. Sci. (9); No. 2: 69–72.

Squires, E.L., R.K. Shideler, and A.O. McKinnon. 1989.

Reproductive Performance of Offspring from Mares Administered Altrenogest During Gestation. Eq. Vet. Sci. (9); No. 2: 73–76.

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.

Manufactured by:
Aurora Pharmaceutical, Inc.
Northfield, Minnesota 55057

Approved by FDA under ANADA # 200-620

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reviewing a history before the next appointment. If the veterinarian prefers to drive, the assistant can be filling out lab submission forms, maintaining a list of items to restock in the truck and creating the preliminary invoice for the next appointment.

When days are long due to a dearth of veterinarians, having an assistant (or two) to handle the responsibilities of lab submissions, truck stocking, invoice preparation and client payments is helpful in reducing stress.

Relief Veterinarians

Although they can be difficult to find, hiring a relief veterinarian can be a lifesaver. For solo practitioners, having the ability to take a week away from the practice can be important for long-term resilience. While some practitioners might simply ask a colleague to cover emergencies and close the practice for routine calls, if a temporary relief doctor can be found, this can be a better solution, especially for longer absences such as maternity leaves or healing from personal injuries or surgeries.

In practices struggling with an unfilled associate position, having a relief veterinarian even one or two days a week can be helpful. Understand that if this becomes a regular routine, the Department of Labor will consider the doctor a part-time employee.

Part-time associates sometimes emerge if you put the word out. There are plenty of veterinarians who once dreamed of a career in equine medicine who now work shifts in companion animal practices but still long for a horse fix. Even one day a week can be mutually beneficial, and as changes come to the equine veterinary field, one might even find those doctors coming back to equine full-time.

In order to minimize expenses, having relief or part-time veterinarians might mean sharing your practice





Wade Shoemaker, DVM
Countryside Large Animal Veterinary Clinic
Greeley, CO

"Altren® (altrenogest) is a product our practice relies on to provide the same active ingredient as Regu-Mate® (altrenogest), but at a much better price point. My clients appreciate the cost savings I can pass on to them. Altren has quickly become the #1 altrenogest in our practice due to the cost savings and specialized packaging.

We routinely send the Altren 150 mL home with clients, especially if we have a problem mare that needs to be on altrenogest after breeding. That will allow us to get out to the ranch at 15 days for the first preg-check and then decide if the mare stays on the Altren or not.

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

Altren® (altrenogest)



Working closely with your veterinarian, a horse owner can tailor a mare's reproductive cycle to meet her and your needs.

Whether you're trying to eliminate behavioral issues associated with heat cycles or keeping an equine athlete out of heat during the competition season, more veterinarians are reaching for Altren® (altrenogest) to manage estrus safely and economically.

Altren® advantages include:

- Safe and Effective – Altren contains the same active ingredient and dosing regimen as Regu-Mate® (altrenogest), but at a fraction of the cost.
- Designed to Work Every Time – Quickly and effectively reduces moodiness and temperament changes associated with estrus and keeps your mare out of heat until YOU decide the proper timing.

Ready When You Are

Altren is the only FDA-approved altrenogest oral solution that's packaged in a convenient 150 mL individualized treatment package with a vented draw-off cap assuring a proper dose at the best price.

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vehicle while you take a well-deserved day off. Or perhaps you had an associate who left your practice, so you have an extra vehicle. When your technician doesn't have independent appointments scheduled, this vehicle could be used by a part-time veterinarian.

Emergency Duty

Multiple studies have reported that emergency duty is one of the factors that limits younger vets from entering equine practice and keeps established vets from remaining in the industry.

Forming an emergency cooperative is a way to minimize necessary emergency shifts for equine veterinarians. Especially for those who are struggling with an increased workload and a decreased number of team members, having fewer on-call shifts can significantly reduce the stress and exhaustion that doctors experience.

A recent study showed that practices worry about losing revenue and control over cases when they share duty with other practices' veterinarians. In reality, those practitioners who join emergency cooperatives find that the increase in personal time more than adequately compensates for those issues.

Important aspects to building a successful emergency collaboration include clear communication, trust between colleagues and regular in-person meetings, preferably while sharing a meal. The camaraderie that develops often leads to higher job satisfaction beyond the benefit of less emergency duty, sometimes even leading to additional collaborative efforts for relief when a member of the cooperative has a medical or maternity leave.

Emergency Referrals Only

Another way to deal with the inevitable emergencies is to develop a policy where all emergencies after early evening are referred to a hospital for care. This obviously requires that a referral hospital be available within a reasonable driving distance, that the patient be ambulatory, and that the clients be well informed about their need for transportation prior to an emergency. While laws typically require that veterinarians provide emergency care to their patients, that can include care provided through referrals.

Referral hospitals often can build a profit center related to emergency treatment, earning significant revenue in this segment of care. The care provided in a well-lit, temperature-controlled environment with personnel and equipment close at hand often provides a much more satisfactory experience for all involved.



THINKSTOCK IMAGES

Setting good boundaries with clients will help decrease work pressures.

Undoubtedly this change in the tradition of equine veterinary care will be difficult for horse owners, but just as pet owners have accepted emergency care centers for their small animals, horse owners will need to adapt to new paradigms.

The important mantra in rolling out this change is to be sure to not surprise or confuse clients. They need clear communication about expectations for emergency care.

Fewer Routine Days

When you have high demand from clients and fewer veterinarians to provide care, it might make sense to reduce the number of days of the week you provide routine elective services. If this means that people must wait several weeks to get on your schedule, that's OK. Schedule time for urgent care into each day, and if none arises, enjoy that time to take a moment to de-stress by doing something you enjoy, whether it's riding your horse, playing a round of golf or taking a walk.

Many practices are reducing their normal work week to four days. This schedule also reduces the average number of hours veterinarians work per week, thus can help attract associates.

Setting Boundaries

Setting good boundaries with clients will also help decrease the pressures you might feel. Depending upon your cell phone brand, you can often set an automatic message stating that non-emergency texts will be returned at the start of the next workday. This helps to train your clients not to expect immediate answers after hours.

Even if you prefer to write an answer to a text message immediately, you can schedule the message to be delivered during normal business hours.

For voice mail, you can set a voice message with the same parameters. Clients having limited access to doctors after hours (outside of whomever is on emergency duty) is not an unreasonable boundary. No one typically can reach a personal physician or pediatrician even during business hours, much less at night or on the weekends. It is not an expectation that equine veterinarians should continue to promote.

Change is hard for everyone, so there



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Exhausted practitioners continue to leave the profession, which means there will be fewer horse doctors to go around.

might be pushback when you limit your availability to clients. They need to understand why the changes are necessary. Preserving your health and well-being will help ensure that you will still be practicing when they need you. You cannot get a drink from an empty well, and as exhausted equine practitioners continue to leave the profession, there will be fewer horse doctors to go around.

Firing Clients

If your work is insurmountable and you find that you are unable to provide customer service that you can be proud of, consider letting your less-desirable clients go. These will be the people who overrun your boundaries, challenge your expertise, make you dread visiting them, do not share your values or continually fail to pay you on time.

You should inform them in writing that you will be unable to provide their horses with care as of a certain date. Offer to transfer their records to a different veterinarian and give suggestions for alternate practices if you wish.

"Due to our growing inability to meet the medical needs of all of our patients in a timely fashion … " are phrases that can be used in this letter.

The Price Vets Pay

Equine practice is unpredictable, with little control over when emergencies arise. This requires flexibility from doctors, who often must be available with no end to their workdays. Veterinarians typically put the needs of their patients and clients before their own. The satisfaction of a making a difference in the world by helping animals and people in need can be large. However, sometimes veterinarians become emptied out and exhausted by this continual giving.

Compassion fatigue can manifest as a feeling of being completely tapped out. While this emotion can be fleeting, sometimes it begins to show up on a daily basis as anxiety, depression or irritation. If you have a very busy day with schedule interruptions, equipment malfunctions or other challenges, you might feel a bit unhinged. On these kinds of days, it is especially important to take care of your basic needs.

Make sure to eat lunch and drink plenty of water. Try to give yourself some short breaks, even something as simple as standing with your face to the sun on a wintry cold day. Listening to music while driving between calls or visiting on the phone with a friend or colleague can bring you some enjoyment. Engaging in this way can help to reset your emotional state.

If you are feeling anxiety and/or irritation, taking a few minutes for "tactical breathing" can help you to operate from your neocortex rather than your amygdala. This substitutes logic and empathy for the survival responses of freeze, flight or fight. This type of breathing calls for you to visualize a box. You inhale while counting to four and visualizing ascending the left side of the box. Hold your breath for a count of four while traveling horizontally on the top of the box to the right. Then exhale for a count of four while descending vertically on the right side of the box. Hold your breath for a count of four while moving to the left across the bottom of the box. After taking several circuits around the box, your limbic system will quiet, and you should feel more grounded and relaxed.

Take-Home Message

With long and unrelenting days going on with no relief in sight, veterinarians can simply run out of gas. The darkness of feeling trapped and having no choices might descend. As doctors continue to push themselves, they might lose the joy they once had in their work and become detached. Decision making and clinical curiosity suffer, and patient care and client service might decline.

In this situation, the practitioner must brainstorm possible solutions, such as those suggested above, in order to free some time off for rejuvenation.

Life is so much more than work, and it can be unexpectedly short. It is said that no one on their deathbed wishes they had more moments at work—almost everyone wishes they had spent more time with the ones they love.

Equine practice can be whatever you create. Horses will continue to need veterinary services, but you can choose how to work in the industry, and you can choose how to live your life. EM

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FOURTEEN YEARS OF EQUINE RESPIRATORY BIOSURVEILLANCE

The Merck Animal Health Equine Respiratory Biosurveillance Program, in conjunction with UC Davis, has helped veterinarians better protect horses.

By Kimberly S. Brown

In 2008, Merck Animal Health started working with the researchers at the University of California, Davis, to test field samples from horses with upper respiratory disease. Nicola Pusterla, DVM, PhD, DACVIM, DAVDC-Eq, oversees the university's PCR laboratory.

The next step of the Merck Animal Health Equine Respiratory Biosurveillance Program was involving veterinarians in the field to provide samples from horses showing clinical signs. There are more than 250 veterinarians enrolled and providing samples. In return, they get fast, accurate testing useful to their practices.

Overall, more than 10,000 samples have been tested, to achieve these Respiratory Biosurveillance Program goals:

- to provide participating veterinarians with a valuable diagnostic tool that helps them accurately identify, treat and manage the equine respiratory disease that they're encountering;
- to provide the equine industry with a better understanding of the prevalence and epidemiology of common upper respiratory pathogens;
- to identify and monitor the current circulating strains of major equine respiratory pathogens; and
- to evaluate the efficacy of current vaccination protocols.

The primary upper respiratory diseases tested for in this program are equine herpesvirus types 1 and 4, equine influenza virus, *Streptococcus equi* subspecies *equi* (strangles), and equine rhinitis A and B virus (which were added to the testing panel in 2012).

TESTING FOR EFFECTIVE TREATMENT

One finding from the Merck Animal Health Equine Respiratory Biosurveillance Program is that testing febrile horses with a cough or snotty nose won't necessarily elicit the same results, even given the same clinical signs. The program also has shown that sometimes clinical signs don't match up with the classic impression of a particular disease. This is especially true with *S. equi*.

In addition, testing through the Biosurveillance Program sometimes identifies more than one pathogen in a horse. Rather than making assumptions, identifying the pathogens helps veterinarians develop more informed and effective treatment plans.

TIMELY PREVENTION

Through this program, researchers also identified that while any disease can occur at any time, there are some "seasonalities" with particular pathogens.[1] For example, the research shows:

- Equine influenza virus incidence starts to increase in early fall (about November) and continues to rise until it starts tailing off in March.
- Equine herpesvirus type 4 usually occurs in the fall, showing rises in incidence in August and peaking in October to early November.
- Equine Herpesvirus type 4 positive samples continue to decline through December and into the early months of the year.
- *Strep equi* occurred a little more frequently in January through May, but the disease remained steady in testing throughout the year. That probably reflects how strangles can continually circulate in a population, sometimes undetected.

Knowing this "seasonal" information from the program can help equine veterinarians better manage and vaccinate horses in order to better protect those animals.

MUTATING FLU VIRUS

Another discovery of the Biosurveillance Program is something that has become all too familiar to the world's human population in the past few years: Respiratory viruses mutate and change. Equine influenza is no different. That is why it is important to study which strains of virus are causing illness every year.

Knowing the strains of equine influenza that are circulating and causing illness, and knowing what strains are in vaccines, can help veterinarians better understand how to protect horses.

YOUNG AND OLD

It's important to note that based on findings in this study, equine influenza is not just a disease of younger horses. In fact, data showed that the median age of equine influenza cases tends to be in horses from 1 to 9 years of age.[1]

And flu isn't the only respiratory disease that has been considered to be a "young horse" problem. Strangles in this study was more common in 6- to 10-year-old horses.[1]

There is so much more that has been learned from the Merck Animal Health Equine Respiratory Biosurveillance Program. Talk to your Merck Animal Health representative or one of the professional services veterinarians to learn more about how you can become involved in the program.

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1 Merck Animal Health and University of California, Davis, School of Veterinary Medicine (Dr. Nicola Pusterla). Infectious Upper Respiratory Disease Surveillance Program. Ongoing research 2008-present.

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MERCK Animal Health



Early responses in the respiratory tract shape what happens later on with adaptive immunity.

ARND BRONKHORST PHOTOGRAPHY

Equine Herpesvirus Update

There is still much to be learned about equine herpesvirus, especially the need for developing risk assessments.

By Nancy S. Loving, DVM

The alpha-herpesviruses are a worldwide problem, causing upper respiratory tract disease, abortion, neonatal death and chorioretinopathy. Herpes-related neurologic disease (equine herpesvirus myeloencephalopathy or EHM) occurs in about 10% of horses infected with equine herpesvirus type 1 (EHV-1), with clinical signs ranging from temporary hind limb ataxia to complete paralysis. EHM has a huge economic impact as well as high morbidity and mortality.

At the 2021 AAEP Convention in Nashville, Tennessee, several infectious disease experts presented updated information on equine alpha- and gamma-herpesvirus.



ISTOCK

Equine herpesvirus myeloencephalopathy (EHM) can occur in about 10% of EHV-1 infected horses.

EHV-1 and EHM

Gisela Soboll Hussey, DVM, MS, PhD, of Michigan State University, discussed some salient facts about equine herpesvirus (EHV-1) pathogenesis and potentials for control. As a refresher, she described how the virus is inhaled into the upper respiratory tract, where it replicates in the epithelium, then passes into local lymphocytes and lymphoid tissue to cause cell-associated viremia. Then it infects vascular endothelia of secondary

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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

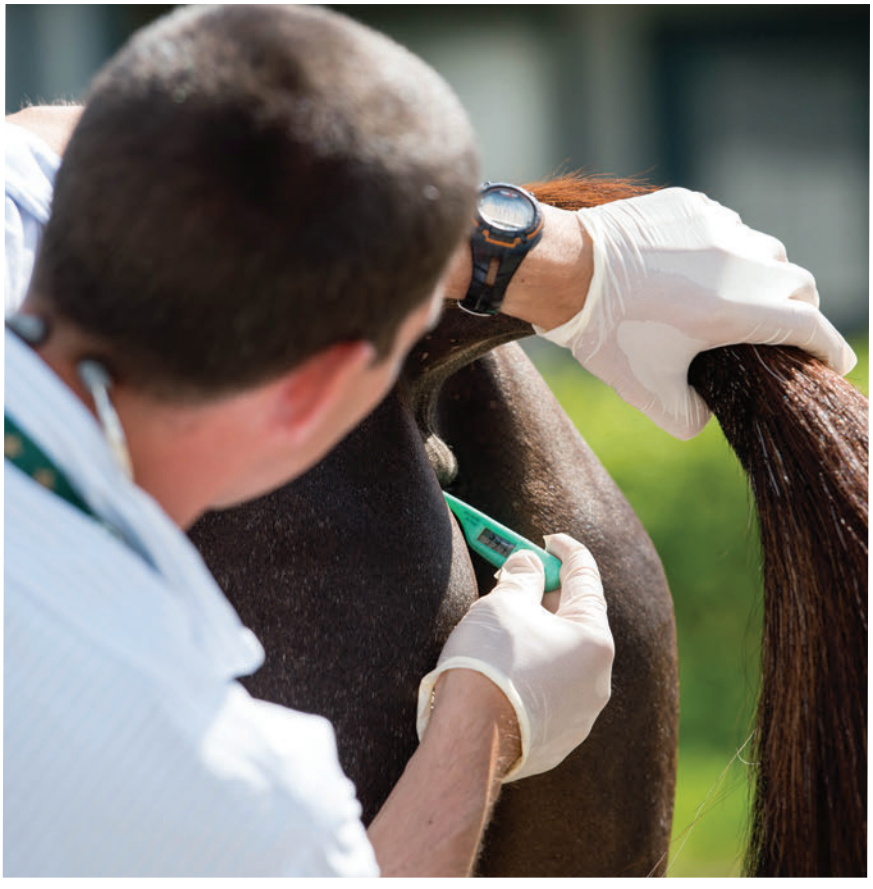
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DUSTY PERIN

In a study by Dr. Hussey, young horses infected with a neuropathogenic strain of EHV-1 exhibited classic biphasic fever while older infected horses only had fever during onset of viremia.

sites of the uterus or spinal cord. This leads to leukocyte infiltration with thrombosis and tissue destruction to cause secondary disease manifestations.

A mutation in the polymerase gene of the virus occurs in paralytic and abortigenic strains with both able to cause EHM. The "non-neuropathogenic" strain that typically causes abortion tends to cause a smaller magnitude and severity of viremia, so there is less chance for the virus to move from the respiratory tract to the spinal cord.

Other risk factors include age, gender, stress, breed and presence of pregnancy. Horses younger than 15 years of age develop EHM at an incidence of <10% while horses older than 20 years of age have a 50-70% risk. It is possible that younger immune systems might be more capable of warding off EHM.

Hussey described a study comparing young and old horses infected with a neuropathogenic strain of EHV-1 to identify host factors. Nine young horses around 2 years of age and 10 old horses were included in the study. Following infection, the young horses exhibited the classic biphasic fever response associated with respiratory disease onset followed by the onset of viremia, while the only fever experienced by the older horses was during the onset of viremia.

The young horses had significant respiratory disease while the older horses did not. Young horses shed more nasal virus while the older horses had higher viremic levels. EHM signs occurred in

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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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A Chat with Dr. Pusterla

There is still much to be learned about herpesviruses. Nicola Pusterla, DVM, PhD, DACVIM, DAVDC-Equine, of the University of California, Davis, said in a personal interview with EquiManagement that we "can make an impact in outcome, but not outbreak" when it comes to herpesvirus infection. He feels that researchers and veterinarians can make a difference in reducing disease, neurologic cases and deaths in horses.

One factor that Pusterla said needs funded for research is assessing risk. He said veterinarians need to better understand how risk is associated with the time of year, the location, the density of horses and the type of event, and understand what else is reported during outbreaks. "We're in the stone age here" with regard to understanding equine herpesvirus outbreaks, he explained. "We don't even know what veterinarians at show grounds are seeing on a daily basis—fever, colic, tying-up, etc. We want to put a 'metric' on communication of respiratory patterns of horses going to a show. We need to figure out what is feasible, sustainable and financially sound to reduce risk."

Asked what this would take to understand these risk factors, Pusterla said, "Money—and many researchers willing to tackle the issues! But I don't want to drive this bus. Our lab does a lot of epidemiologic work that could be our contribution. A lot of other researchers need to be involved. We need to ask horse owners how important safety of the horse is at a show grounds and what they are willing to do. If, at a show, a horse has an elevated temperature, it can go to 'pre-isolation' on the show grounds. Keep it there and run blood and test it, and if positive [for a contagious/infectious disease] move it to isolation. If not, it is not out of the show yet. A horse can run a fever for other reasons [than an infectious/contagious disease], and the incentive is that it's not 'booted off the island' before we know the cause."

Pusterla said the thermochip (a microchip embedded in the horse that can be scanned with an app to record temperature without having to take rectal temperatures) "will be a game changer" in the management of infectious/contagious disease at horse shows and events because no one has to catch the horse, halter the horse, take the temperature and record it. It all can be done with limited contact with the horse.—*Kimberly S. Brown*

nine of 10 older horses, and six had to be euthanized. EHM signs occurred in only one of the nine young horses, and that horse recovered spontaneously.

Immune responses varied at different sites of infection:

- In the respiratory tract, protected horses had early production of IFN-alpha (interferon) and Il-17 early on days 1-2 post-infection. EHM horses secrete Il-10 early on, but not much interferon resulting in polarization of dendritic cells to send qualitatively different signals to T cells to stimulate them to proliferate and secrete cytokines.
- In the CSF, there is delayed onset of interferon response in EHM horses with increased expression of regulatory cytokines and Il-10.

Cytokines are part of the innate immune response, with TH2-adaptive immunity during the viremic phase developing high serum IgGT (IgG3/5) in horses that develop EHM. There was no difference in viral neutralizing antibodies (which protect against viral shedding) between control horses and those affected with EHM. EHM horses had significantly higher IgGT (IgG3/5) responses prior to infection and more significant induction of these antibody titers following infection.

Early responses in the respiratory tract shape what happens later on with adaptive immunity.

Hussey asked, "Can we change the early immune events at the respiratory tract?" She wonders whether it is possible to shift to a greater interferon response in the respiratory tract to develop a TH1-adaptive response to prevent neurologic disease. Perhaps adjuvants or supplements can be used to alter respiratory immunity, or perhaps there is a potential for viral gene modulation.

With this in mind, she suggested that middle-age or older horses might be useful as a model for evaluation of vaccine efficacy.

Without any available vaccine products to protect against EHM, control is limited to biosecurity measures, which are the cornerstone of protection and prevention. Transmission is most easily accomplished with contact and less so with aerosol spread, she said.

An infected horse should be isolated for 21 days after the last new infection. Personnel and equipment should be dedicated to only care for an infected horse. Small animals should be kept away as they can spread disease across a facility. (See US Animal Health Association Committee on Equine's EHM guidelines for State Animal Health Officials here: saha.org/upload/Publication/Top%20Specific/EHM_Guidance_Document_Revised_Fe.pdf.)



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A Chat with Dr. Flynn

EquiManagement also spoke with Kentucky State Veterinarian Katie Flynn, BVMS, MRCVS, about equine herpesvirus. Previously Flynn was the equine staff veterinarian for the California Department of Food and Agriculture Animal Health Branch, and she has served as chair of the AAEP Infectious Disease Committee.

Flynn's areas of interest include biosecurity—specifically equine event biosecurity. She has developed biosecurity educational materials that have been distributed to all 50 states and many other countries. (EquiManagement has posted that "Biosecurity Toolkit for Equine Events" on EquiManagement.com. Search for "Biosecurity Toolkit" to find the article. We also will include in that article a report by Flynn and Dr. Peter Timoney to the 2018 US Animal Health group meeting, which occurred after the Ogden, Utah, EHV-1 outbreak.)

One of the issues that Flynn said is critical to preventing these outbreaks is getting horse owners and trainers to buy into biosecurity measures. "It comes down to owner responsibility," said Flynn. "Only they can control this at the horse level."

A couple of incidences she recalled when working in California included one where a horse was reported to have a fever by an unrelated trainer. That trainer went into the horse's stall and took its temperature when the horse's own trainer had reported the horse was normal.

In another instance, grooms were writing horse temperatures on stall charts before the grooms actually took the horses' temperatures.

She agrees with Dr. Nicola Pusterla about the advantage of microchips that can be used to take a horse's temperature with limited contact with the horse. "That's the best thing we could do," said Flynn of required biochips. "I've been advocating for that for 10 years."

She noted that the US Trotting Association (USTA) now requires the biochip for all racing Standardbreds. The organization's website noted: "By 2022, all horses that are racing in the U.S. will need to be microchipped. All USTA member tracks, including county fairs, will identify horses with a microchip. All horses that have been previously freeze branded and that plan on racing in 2022 and beyond must be microchipped by a USTA ID Technician."

The association is using Merck Animal Health Bio-Thermo® microchips. Merck had noted in a press release: "The USTA embraced the Bio-Thermo microchip because of its ability to serve not only as a dependable means of identification but also as an effective way for caretakers to record the horse's body temperature at the scan of a microchip reader. This saves a significant amount of time over rectal thermometers and helps identify febrile horses sooner."

This technology could provide a non-invasive and less labor-intensive way to monitor a large number of horses' temperatures in a short amount of time, limiting direct contact with the horse. Being able to record fever in a horse before the horse shows clinical signs of disease could be a game changer in biosecurity at horse events.—*Kimberly S. Brown*

EHV-1 Caused by New H752 Genotype

Historically, EHV-1 has been categorized as either D752 (neuropathogenic or paralytic) genotype or N752 (non-neuropathogenic or opportunogenic) genotype, according to Nicola Pusterla, DVM, PhD, DACVIM, DAVDC-Equine, of the University of California, Davis. The severity of disease varies according to a horse's age, immune status, health conditions and the pathogenic potential of the infective strain.

In the outbreak of EHM in Ogden 2011, D752 contributed to 13% morbidity and 3% mortality, with fatality of 39% of EHM-affected horses. The 2021 Valencia, Spain, outbreak with N752 produced 13% morbidity and 1.5% mortality. 73% of EHM-affected horses died.

Yet another outbreak in 2021 occurred in a 31-horse barn in Pennsylvania where the affected horses were mostly warmbloods. The veterinarians were called to the farm to perform dental care, and although the horses looked fine, rectal temperatures revealed fevers of 102-104.4 degrees Fahrenheit. This silent presentation amplified subclinical transmission throughout the barn with a high morbidity rate of 84% (26/31). Four horses developed EHM with mild and transient ataxia, weakness and proprioceptive deficits. Infection occurred in 97% (30/31) but only 84% displayed clinical signs over the course of three weeks, with most developing infection in the first week.

Nasal secretions and whole blood were tested with qPCR, yet the new H752 viral genotype was difficult to detect. One key strategy of identifying the presence of a potentially subclinical form of EHV-1 attributed to H752 is to take twice-daily rectal temperatures. Regular testing for EHV-1 allows monitoring the infection status of individual horses. Pusterla recommended using a multi-gene approach

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EVERY DAY COUNTS.

CONTINUED TREATMENT IS CRUCIAL TO MAINTAINING A HEALTHY HORSE AND CONTROLLING THE SIGNS OF PPID.



CONTROLLED SIGNS:
Clinical signs improved within 3 months and continued through 6 months.[1]

PROVEN SUCCESS:
3 out of 4 horses evaluated were considered treatment successes.[1]

CLEAR IMPROVEMENT:
Hypertrichosis (delayed shedding) improved in 89% of treated horses within 6 months.[1]

IMPORTANT SAFETY INFORMATION: PRASCEND has not been evaluated in breeding, pregnant or lactating horses. Treatment with PRASCEND may cause loss of appetite. Most cases are mild. If severe, a temporary dose reduction may be necessary. PRASCEND tablets should not be crushed due to the potential for increased human exposure. PRASCEND is contraindicated in horses with hypersensitivity to pergolide mesylate or other ergot derivatives. Keep PRASCEND in a secure location out of reach of dogs, cats, and other animals to prevent accidental ingestion or overdose. Dogs have eaten PRASCEND tablets that were placed in food intended for horses or dropped during administration of the tablets to the horses. Adverse reactions may occur if animals other than horses ingest PRASCEND tablets. Refer to the package insert for complete product information.



[1]Prascend® (pergolide tablets) [Freedom of Information Summary], St. Joseph, MO; Boehringer Ingelheim Inc.; 2011.

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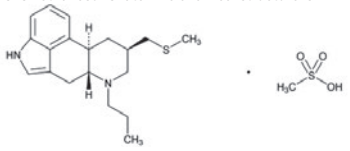
Prascend®

(pergolide tablets)
1 mg

Dopamine receptor agonist for oral use in horses only

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

Description: PRASCEND Tablets are rectangular light red colored, half-scored tablets containing 1 mg pergolide, as pergolide mesylate. Pergolide mesylate is a synthetic ergot derivative and is a potent dopamine receptor agonist. The chemical name of pergolide mesylate is 8ß-[(Methylthio) methyl]-6-propylergoline monomethanesulfonate. The chemical structure is:



Indication: For the control of clinical signs associated with Pituitary Pars Intermedia Dysfunction (Equine Cushing's Disease) in horses.

Dosage and Administration: Administer orally at a starting dose of 2 mcg/kg once daily. Dosage may be adjusted to effect, not to exceed 4 mcg/kg daily.

It has been reported that pergolide tablets may cause eye irritation, an irritating smell, or headache when PRASCEND Tablets are split or crushed. PRASCEND Tablets should not be crushed due to the potential for increased human exposure and care should be taken to minimize exposure when splitting tablets.

Table 1 Dosing Table

Body Weight	Dosage 2 mcg/kg	Dosage 4 mcg/kg
136 - 340 kg (300 - 749 lb)	0.5 tablet	1 tablet
341 - 567 kg (750 - 1,249 lb)	1 tablet	2 tablets
568 - 795 kg (1,250 - 1,749 lb)	1.5 tablets	3 tablets
796 - 1,022 kg (1,750 - 2,249 lb)	2 tablets	4 tablets

The tablets are scored and the calculated dosage should be provided to the nearest one-half tablet increment (see Table 1).

Dosing should be titrated according to individual response to therapy to achieve the lowest effective dose. Dose titration is based on improvement in clinical signs associated with Pituitary Pars Intermedia Dysfunction (PPID) and/or improvement or normalization of endocrine tests (for example, dexamethasone suppression test or endogenous ACTH test).

In some cases, adverse events were reported after a dose increase (see **Post-Approval Experience**).

If signs of dose intolerance develop, the dose should be decreased by half for 3 to 5 days and then titrated back up in 2 mcg/kg increments every 2 weeks until the desired effect is achieved.

Contraindications: PRASCEND is contraindicated in horses with hypersensitivity to pergolide mesylate or other ergot derivatives.

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

Keep PRASCEND in a secure location out of reach of dogs, cats, and other animals to prevent accidental ingestion or overdose.

Dogs have eaten PRASCEND tablets that were placed in food intended for horses or dropped during administration of the tablets to the horses. Adverse reactions may occur if animals other than horses ingest PRASCEND tablets (see **Post-Approval Experience**).

Human Warnings: Not for use in humans. Keep this and all medications out of the reach of children. PRASCEND should not be administered by persons who have had adverse reactions to ergotamine or other ergot derivatives.

Pregnant or lactating women should wear gloves when administering this product. It has been reported that pergolide tablets may cause eye irritation, an irritating smell, or headache when PRASCEND Tablets are split or crushed. PRASCEND Tablets should not be crushed due to the potential for increased human exposure and care should be taken to minimize exposure when splitting tablets. Consult a physician in case of accidental ingestion by humans.

Precautions: Treatment with PRASCEND may cause inappetence.

The use of PRASCEND in breeding, pregnant, or lactating horses has not been evaluated. The effects of pergolide mesylate on breeding, pregnant, or lactating horses are not known; however, the pharmacologic action of pergolide mesylate suggests that it may interfere with reproductive functions such as lactation.

PRASCEND is approximately 90% associated with plasma proteins. Use caution if administering PRASCEND with other drugs that affect protein binding. Dopamine antagonists, such as neuroleptics (phenothiazines, domperidone) or metoclopramide, ordinarily should not be administered concurrently with PRASCEND (a dopamine agonist) since these agents may diminish the effectiveness of Prascend.

Adverse Reactions:

Pre-Approval Experience: A total of 122 horses treated with PRASCEND Tablets for six months were included in a field study safety analysis.

Table 2 Summary of the most common adverse reactions (N=122)

Clinical sign	# Cases	Cases (%)
Decreased appetite	40	32.8
Lameness	22	18.0
Diarrhea/Loose stool	12	9.8
Colic	12	9.8
Lethargy	12	9.8
Abnormal Weight Loss	11	9.0
Laminitis*	10	8.2
Heart murmur	10	8.2
Death	8	6.6
Tooth disorder	8	6.6
Skin abscess	7	5.7
Musculoskeletal pain	6	4.9
Behavior change	6	4.9

*Three new cases and 7 pre-existing, recurring cases

Inappetence or decreased appetite occurred at one or more meals in 40 of 122 horses treated with Prascend. At the baseline evaluation 1.6% of owners reported a history of inappetence or decreased appetite as compared to the 32.8% of horses that experienced inappetence or decreased appetite during the study. Most cases of inappetence were transient and occurred during the first month of treatment; however, some horses experienced sporadic inappetence throughout the study. Two horses required a temporary reduction in dose due to inappetence during the first month of the study. Both horses returned to their original dose within 30 days.

Weight loss occurred in more than half of the horses in this study; however, weight loss that was considered abnormal was only reported in 11 horses.

Lethargy was reported in 9.8% of horses during the study, and was not reported in any horses at the baseline evaluation.

Behavioral changes were noted in 6 horses including aggression, kicking, agitation, nervous behavior and increased activity. One horse required a temporary reduction in dose due to energetic behavior during the first month of the study.

Eight horses died or were euthanized during the study due to worsening of pre-existing conditions (laminitis, dental disease, septic tenosynovitis), or colic (strangulating lipomas, large colon volvulus).

One mare was inadvertently enrolled in the study while pregnant and experienced dystocia resulting in the death of the foal.

Post-Approval Experience (2019):

The following adverse events are based on post approval adverse drug experience reporting for PRASCEND. Not all adverse events are reported. 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 in horses are categorized in order of decreasing reporting frequency by body system and in decreasing order of reporting frequency within each body system:

General: anorexia, lethargy, weight loss
Gastrointestinal: diarrhea, abdominal pain/colic
Dermatological: alopecia, hyperhidrosis, dermatitis
Musculoskeletal: laminitis, muscle stiffness/soreness
Neurological: ataxia, seizure, muscle tremors
Behavioral: aggression (to other horses and humans), hyperactivity (anxiety, agitation), other behavioral changes (stud-like behavior, spooky, unpredictable, confused)
Clinical pathology: anemia, elevated liver enzymes, thrombocytopenia

The above adverse events were reported in some horses at starting dose levels, while in the others following a dose increase.

Death (including euthanasia) has been reported.

Adverse events have been reported in dogs following ingestion of tablets prepared for administration to horses.

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

Clinical Pharmacology: Pergolide mesylate is a synthetic ergot derivative and is a potent dopamine receptor agonist. As with other dopamine agonists, pergolide inhibits the release of prolactin which suggests that it may interfere with lactation. In horses with PPID, pergolide is believed to exert its therapeutic effect by stimulating dopamine receptors, and has been shown to decrease the plasma levels of adrenocorticotropic hormone (ACTH), melanocyte stimulating hormone (MSH), and other pro-opiomelanocortin peptides.[1]

Pharmacokinetic information in the horse is based on a study using single oral doses of 10 mcg/kg in six healthy mares between 3 and 17 years of age.[2] Pergolide was rapidly absorbed; the mean maximum concentration (Cmax) was 4.05±2.02 ng/mL with the median time to maximum concentration (Tmax) being 0.415 hours.

The area under the curve (AUC) was 14.08±7.46 hr·ng/mL. The mean half life (T1/2) was 5.86±3.42 hours; the mean apparent oral clearance (CL/F) was 1204 mL/kg/hr; and the mean apparent volume of distribution (V/F) was 3082±1354 mL/kg.

Effectiveness: An open-label, historical control, field study evaluated the effectiveness of PRASCEND for the control of clinical signs of PPID. A total of 122 horses with PPID were enrolled in the study, 113 of which were included in effectiveness evaluations. The success of each horse was based on results of endocrinology testing (dexamethasone suppression test or endogenous ACTH test) and/or improvement in clinical signs related to PPID (hirsutism, hyperhidrosis, polyuria/polydypsia, abnormal fat distribution, and/or muscle-wasting) on the Day 180 evaluation. Based on endocrine testing and investigators' clinical assessment scores, 86 (76.1%) of the 113 evaluable cases were treatment successes.

Table 3 Proportion of Treatment Successes on Day 180

Percent success	lower bound: one-sided 95% confidence interval
76.1% (86/113)	68.6%

Enrolled horses were diagnosed with PPID based on the presence of hirsutism and an abnormal pre-study endocrine test result. All horses were treated with 2 mcg/kg PRASCEND (to the nearest one-half tablet) orally once daily for the first three months. If the endocrine test result on Day 90 was normal or adequately improved, the horse continued on the same dose through Day 180. If the endocrine test result on Day 90 was abnormal, the dose increased to 4 mcg/kg given once daily through Day 180. Forty-seven (41.6%) of the 113 horses included in the effectiveness database required a dose increase at Day 90.

Table 4 Percent of Animals with Improvement in Clinical Signs Relative to Baseline Scores

Clinical sign	Day 90±7 (%)	Day 180±7 (%)
Hirsutism	32.7%	89.2%
Hyperhidrosis	27.4%	42.3%
Polyuria / polydypsia	31.0%	34.2%
Abnormal fat distribution	21.2%	33.3%
Muscle wasting	36.3%	46.0%

Table 5 Endocrine Test Results (mean values)

Test	# Animals	Baseline	Day 90	Day 180
ACTH (pg/mL)	20	73.53	51.12	45.08
DST** (mcg/dL)	93	3.12	1.39	1.47

** Dexamethasone suppression test: Post dexamethasone cortisol concentration

Improvement was noted in scores for all clinical sign categories and in mean results for endocrine tests.

Animal Safety: In a six month target animal safety study healthy adult horses received PRASCEND administered orally, once daily, at doses of either 0 mcg/kg, 4 mcg/kg, 6 mcg/kg, or 8 mcg/kg (0X, 1X, 1.5X, or 2X the maximum recommended dose). There were eight healthy horses (four males and four females) in each treatment group. Doses were prepared by dissolving tablets in approximately 10 mL of a 50% sugar water solution.

PRASCEND treated groups had lower mean heart rates and higher mean temperatures than the control group. Horses in all treatment groups had minimum heart rates within the normal range and maximum temperatures below 101.5°F. One 1.5X horse experienced a mild episode of spasmodic colic on Day 3 that resolved after treatment with flunixin meglumine.

Mean red blood cell counts and hemoglobin values were lower in PRASCEND treated groups as compared to the control group. Other hematology parameters including hematocrit, white blood cells, absolute neutrophils, and absolute lymphocytes exhibited mild, transient decreases as compared to the control group. The hematology parameters generally decreased over the first 30 to 60 days after treatment initiation and then returned to values similar to pre-treatment levels. No treatment related alterations were identified on histopathology evaluation of bone marrow.

Storage: Store at or below 25°C (77°F).

How Supplied: PRASCEND Tablets are available in 1 mg strength — packaged 10 tablets per blister and 60 or 160 tablets per carton.
NDC 0010-4489-01 — 60 tablets
NDC 0010-4489-02 — 160 tablets

Approved by FDA under NADA # 141-331

References:

[1] Orth, D.N., Holscher, M.A., Wilson, M.G., et al. (1982). Equine Cushing's Disease: Plasma Immunoreactive Proopiolipomelanocortin Peptide and Cortisol Levels Basally and in Response to Diagnostic Tests. Endocrinology. 110(4):1430-41.

[2] Wright A, Gehring R, Coetzee H (2008). Pharmacokinetics of pergolide in normal mares. American College of Veterinary Internal Medicine Forum, Abstract #36, San Antonio, TX.

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While not mentioned elsewhere in this article, there was yet another equine herpesvirus outbreak, this time in California in early 2022.

with molecular diagnostics to look for D752, N752 and H752.

It is important to test all horses that have been exposed and to treat all those that are viremic.

Early intervention with valacyclovir helped to clear viremia—42% were positive on Day 1 for EHV-1 and none were positive on Day 7. Valacyclovir was given orally at 30 mg/kg every 8 hours for six doses and maintained at 20 mg/kg every 12 hours. It was effective at decreasing viremia, but if discontinued, a horse remains susceptible to infection.

The horses also received flunixin meglumine and heparin (50 IU/kg subcutaneous every 12 hours).

The Pennsylvania horses were treated for eleven to 25 days, and there was no mortality in this outbreak.

Gamma Herpesviruses

There is a potpourri of herpesviruses that can infect horses, and Lutz Goehring, DVM, MS, PhD, DACVIM, DECEIM, of the University of Kentucky, described the gamma herpesviruses EHV-2 and EHV-5. There is world-wide distribution of these viruses, including in Iceland, which is EHV-1 free.

EHV-2 is far more prevalent than EHV-5, and both are highly cell-associated in lymphocytes. EHV-2 occurs mostly in foals younger than 10 days old, probably through horizontal transmission from the dam as there is no evidence of vertical transmission. Disease is usually mild or non-clinical, and it persists in the population; more severe cases are likely immune-mediated. Detection is usually identified from PCR evaluation of nasal or conjunctival swabs, tracheal aspirates, or BAL procedures during diagnostic evaluation of various non-pathologic or pathologic conditions. It is easy to detect EHV-2 but more difficult for EHV-5.

Un-weaned foals tend to develop upper airway disease and lymphadenopathy. Studies of inflammatory airway disease and exercise intolerance in older horses have identified gamma herpesviruses. Adults with fever and respiratory distress might experience multinodular pulmonary fibrosis from EHV-5 confirmed on radiographs as nodules infiltrated with lymphocytes and monocytes.

Due to its expense, one question that is asked is whether valacyclovir is a valid treatment option.

Valacyclovir is well absorbed and converts to an active form of acyclovir that must be phosphorylated by a viral enzyme (thymidine kinase) to lock the drug in the cell. Then it is phosphorylated again by the host, so it is built into viral DNA to stop the virus. But thymidine kinase is not present in an effective amount, so acyclovir doesn't tend to be phosphorylated.

Regardless of whether cases were treated or not, the number of genome copies remained the same—in other words, there is no efficacy in using valacyclovir.

With this result, Goehring advised that there is a need to focus instead on inflammation control and immunomodulation of horses affected with gamma herpesviruses.

Take-Home Message

The way forward in understanding and controlling equine herpesvirus disease and outbreaks seems to rely on additional information-gathering, developing risk assessments and engaging horse owners to take responsibility for monitoring and movement of their horses. Veterinarians and their clients need to monitor horses, watch for temperature spikes, and isolate and test appropriately until the cause of fever is known.

Above all, the movement of exposed horses needs to be closely controlled and monitored to avoid spreading infectious/contagious diseases to susceptible populations. EM



GETTY IMAGES

By creating a strong brand, you will attract the "right" clients and be happier and more successful in your work.

Attracting the 'Right' Clients to Your Practice

Understanding and reflecting who you are as a veterinarian and a practice is the basis for finding and keeping the 'right' clients for you.

By Amy L. Grice, VMD, MBA

Every business has a brand identity, and equine veterinary practices are no exception. Some firms work hard to create that identity, and some are completely unaware of how they are viewed by the equine community.

Businesses' brand identities can be seen as similar to their personalities. Branding can be defined as who you are as a company. It's your values and your mission. It's the way you treat your customers. It's the look and feel of your truck, your office and your team. So, before you can move forward with the more practical steps like designing a logo, you need to invest time to understand who you are and who you want to be as a practice—in other words, your brand identity.

One can even think of a brand as being like a person and use words to describe it. A word to describe Apple might be "innovative." A word to describe Walmart might be "affordable." What word describes your practice? "Compassionate"? "Specialized"? "Reliable"?

Why do people prefer certain brands? When you think of buying a can of cola-flavored soda at the convenience store, do you prefer to buy the generic brand, or do you spend a little more for a Coke or a Pepsi? If so, why? The consistency of the experience with a name brand is typically what motivates people to spend more. It's worth it to them to know what they're getting in the can, and that it will be exactly the same every time. So, too, clients will typically choose to be loyal and willing to pay more when they know they will have a reliably superior experience at your practice.

Once you are committed to creating a consistent brand identity, there is freedom to determine how to position the practice within the equine industry. The practice should create a brand that is

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Your practice's "brand" should reflect the skills and values of the practice owner or owners.

reflective of the skills and values of the owners. The values of kindness, reliability and effective communication could be the foundation of one practice's brand. Or the values of technical excellence, cutting-edge medicine and excellence might be the identity of another firm. Clients will most often choose a practice that shares their values and priorities. Consequently, their satisfaction with their experience is often superior.

It is similar for a doctor serving clients who appreciate that person's brand identity. Clients who have chosen you deliberately for who you are and what you do have a much more satisfying partnership with you than if you are trying to please someone who doesn't actually respect who you are or want what you are offering.

Attracting the Right Clients

In order to attract clients who appreciate your brand and share your values, they need to be aware of what you represent. This is what shaping, creating and reinforcing your brand identity is all about.

The process for building an intentional brand identity begins with identifying your most strongly held values as a practice. Does ethical practice trump being known worldwide for your expertise? Does reliability mean more to you than financial success? Not that any of these attributes are mutually exclusive, but it is important to understand where your priorities lie. It is only in this way that you will have clients who trust your recommendations wholeheartedly because they share your views about the relative importance of things.

Creating your brand encompasses thinking of what kind of a person you'd like your practice to be, hiring people that share those values, communicating your company values regularly to your staff, and bringing them to life in every experience that clients have with your business.

The consistency of that experience is what makes a brand powerful. If you want to attract clients who love their horses through sickness as well as health, every interaction your team members have with the patients and their owners must exhibit caring and kindness.

If supporting world-class athletes is your dream, you can be kind, but your team must demonstrate world-class medical care in every moment. The expertise of the services might sometimes exceed the kindness in the exchange, without any loss of client trust. Conversely, a client who prioritizes compassion will likely be unsatisfied about receiving unparalleled technical expertise with a dismissive bedside manner.

To maximize your clients' satisfaction, they need to be aligned with your brand identity. Communicating that identity to attract the right people will be most successful if you have a unique visual symbol, or logo, and a tagline or slogan.

For example, a practice that prioritizes compassion throughout the lifespan of patients might have "A Lifetime of Caring" as its tagline. A practice that prizes ethics might use "Ethical Practice, Every Day."

Another practice that treats primarily competitive athletes might have the slogan "A Winning Edge."

You can quickly understand what is important to each of these practices without knowing anything else about them.

Logos that Reflect You

When choosing a logo design, you want an image that is unique, colorful and memorable. Willow Creek Equine might feature a willow tree. Twin Pines Equine might understandably have two pine trees. Pretty Valley Equine might utilize the "V" of the word Valley to create a picture of a pretty valley.

Incorporating your tagline into your logo design can be an effective way to communicate what your practice is all about.

Once created, your logo and tagline should appear on all of your paperwork, invoices, advertisements, social media, e-mail signatures, etc. Hats, shirts and jackets are great canvases on which to display your brand. Every touchpoint with your client is another opportunity to showcase your brand identity through visual means and the attributes of the entire interaction.

Showcase Your Practice

To filter the clients you want from the general population, consider showcasing your practice's talents with an educational seminar featuring your doctors. If using a projected presentation, add your miniaturized logo to the corner of every slide. Your team's personality will demonstrate the priorities of the practice in the way they present material and answer questions.

If this is a hands-on demonstration, the subtle differences in the way that the presenters and handlers work with the demo horse will inform participants through non-verbal communication. Just as some people believe that dogs should sleep on the bed and others are firm that they should never be on the furniture, horse owners have similar ingrained beliefs. Practice is so much easier when those values are shared.

When creating social media posts or other marketing pieces, be consistent with the feel that you want to promote. Photos should elicit the emotions and words that you want your brand to promote—compassion, excellence, winning, the human-animal bond. You get to decide.

Typically, you should decide on two colors to represent your brand, then use them consistently. Try not to change any visual representations of your brand, even if you are getting tired of them. That's often when clients have finally recognized your brand symbols! Use these colors on your social media, website, work clothing and in your office.

Round Peg, Square Hole

With the number of equine veterinarians decreasing, there is an opportunity for practices to more carefully select the clients they truly want to serve.

You might find that you have accumulated clients over the years that simply don't fit your brand. Don't be afraid to have a conversation about your values if you knock heads over care. For instance, if a trainer pressures you to do maintenance joint injections before the show season on horses that you have not examined in a year, perhaps you will want to discuss how important it is to the practice to only provide clinically warranted care and request permission to perform soundness examinations on the horses on the list. If your request is refused, this might be a client who is better suited to a different practice.



THINKSTOCK

Hiring staff members who share your vision for your practice will make you, your staff and your clients happer and more satisfied.

Your social media posts and client seminar topics will help you attract clients with similar interests as your practice. If your business does a lot of work for Thoroughbred breeding farms, you are likely to post "win" pictures of horses that you helped to conceive or foal through your work. This in turn might attract other breeders to try your services.

If you serve many geriatric "pet" horses, your posts might include educational pieces on PPID, chronic laminitis and nutrition for the older horse. This will encourage horse owners to see you as an expert on aging equines.

If you have added a new skill or service, be sure to highlight it regularly in your posts and personal interactions with clients in order to drive new business with clients who value that service. As with any service, understanding the "why" they would use the service will help clients determine whether their horses are likely to benefit. A practice of primarily pet horses would emphasize the benefits of increased comfort for services such as acupuncture or chiropractic, while a practice concentrating on show horses would emphasize improved performance.

Take-Home Message

Attracting the clients who will most appreciate your practice and value the way you provide services will happen organically when you create a strong brand identity and market it well. Knowing your practice's values and hiring a team that shares those values is the foundation of your brand.

Every interaction with patients and clients can strengthen that identity if there is consistency in every client experience. When everyone in your practice believes in the same vision, they intuitively know the right answers when questions arise. By creating a strong brand, you will attract the "right" clients and be more successful in your work. EM



Veterinarians need to understand that there is no road map to treating equine pain; every horse is different.

ARND BRONKHORST PHOTOGRAPHY

Are You Using the Right Meds for Managing Chronic Pain?

Veterinarians must get out of their comfort zones to get horses into theirs.

By Stacey Oke, DVM, MSc

We veterinarians truly only have a small handful of pharmaceutical medications at our disposal to treat painful conditions in horses. When managing chronic pain, often stemming from the musculoskeletal system, those medications become even more limited, especially if the horse cannot tolerate one or more of those products in the long term.

Lori Bidwell, DVM, DACVAA, is a certified veterinary acupuncturist and owner/veterinarian of the Kentucky-based company East West Equine Sports Medicine. She said that there is a dearth of scientific evidence for many of the commonly prescribed medications and alternative therapies used to manage equine pain.

"Marketing and sponsorship are often the reasons horse owners and trainers choose some therapeutic options, often ones that have no research to back their marketing claims," said Bidwell.

While we might not have all of the answers for the "best" way to manage pain, we do have the freedom to try our hands with what we think are viable options. This does mean, however, that veterinarians need to try new medications and protocols, tailoring the treatments to each individual patient.

"There is no road map when treating pain. Every horse, just like [with] people, responds differently to medications," relayed Bidwell.

In fact, one can suggest that the only wrong way to treat pain is not to treat it at all.

In this article, various options for managing chronic pain in horses are discussed. Holistic products such as Traumeel, Sarapin, Zeel and arnica might also play a valuable role in this arena and are advocated by Bidwell, but this discussion is limited to currently available pharmaceutical treatment options.

Recognizing Chronic Pain

To best address pain, we must anticipate painful situations and/or recognize when a horse is already in pain. Surprisingly,

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pain recognition remains challenging for owners and even some veterinarians. Barriers to pain management, according to an article[1] coauthored by Debra Sellon, DVM, PhD, DACVIM, a professor at Washington State University's College of Veterinary medicine, include the following:

- lack of knowledge of analgesic drugs;
- inadequate pain assessment skills;
- fear of the adverse effects of drugs;
- inadequate communications between doctors and clients; and
- inaccurate assessment of the degree of pain a patient is likely to be experiencing.

"I think there are a lot of owners who are unable to identify low- or even moderate-level discomfort in their horses," said Rachel Hector, DVM, MS, DACVAA, assistant professor in the Department of Anesthesiology, Colorado State University Veterinary Teaching Hospital.

She added, "For example, many horses with chronic discomfort exhibit behavior problems. Rather than recognizing their horse is in pain, owners instead believe their horse is being naughty, pushy, dominant or stubborn."

When indicated, veterinarians need to find ways to help owners identify pain in horses. Using pain scales such as the Horse Grimace Scale (HGS; go to EquiManagement.com and search "horse grimace scale") described by Della Costa in 2014 or exemplary images and online tools (https://www.researchgate.net/figure/Horse-Grimace-Pain-Scale-HGS-The-Horse-Grimace-Pain-Scale-with-images-and-explanations_fig7_260950013) might help.

"I've always liked the concept of asking owners 'What can your animal do today compared to one year ago? Can he still trot? Canter? Lay down and get up? Eat certain things?' If the list is significantly shorter than it was, say, six months ago, maybe there's a quality-of-life situation that needs to be addressed," advised Hector.

Nonsteroidal Anti-inflammatory Drugs (NSAIDs) for Chronic Pain

While this class of drugs might seem somewhat basic, NSAIDs remain first-line medications for which equine practitioners should reach when faced with a horse in pain. While many practitioners have their favorites go-tos, many choices are available (adult horse doses suggested by Bidwell are in the above chart).

DOSES FOR ADULT HORSES SUGGESTED BY DR. LORI BIDWELL

Phenylbutazone	1 g PO q 12 hr
Flunixin meglumine	1 mg/kg PO q 12 hr
Meloxicam	0.6 mg/kg PO q 24 hr
Carprofen	0.7 mg/kg PO q 24 hr
Firocoxib	One 57 mg tablet/1000 lb horse PO q 24 hr
Naproxen	8 mg/kg PO q 24 hr
Ketoprofen	2 mg/kg IV q 24 hr

"Bute is still the most widely used NSAID due to cost and ease of use," said Bidwell. "Ketoprofen is expensive, and although the research has proven that it is a good analgesic with a single dose lasting 24 hours, it is not a go-to for most veterinarians."

In terms of selection, Bidwell said that price and familiarity are important in decision making for every veterinarian.

"Bute is so popular because it is inexpensive and can be given intravenously or orally as a tablet, paste or powder," Bidwell explained. "Drugs like acetaminophen and naproxen are less attractive because they need to be given with another NSAIDs/medication in order to be most effective."

Hector added: "I think price, familiarity and availability all affect what people use. Currently, drug prices are all over the place!"

Bidwell noted: "Importantly, if a horse isn't responding to one NSAID, find a different NSAID that works for that horse."

Unfortunately, few head-to-head studies are available to provide clear recommendations regarding NSAID selection. One recent study authored by Banse and Cribb (2017)[2] directly compared meloxicam and phenylbutazone using two different models of pain: a mechanical pain model induced by an adjustable heart bar shoe and an inflammatory pain model induced by intra-articular injection of lipopolysaccharide.

In that study, phenylbutazone was administered at 4.4 mg/kg PO q 12 hr and meloxicam was administered at 0.6 mg/kg PO q 24 hr. Phenylbutazone appeared superior to meloxicam for reducing multiple indicators of pain in the heart bar shoe model. In fact, no significant different in lameness was appreciated between horses treated with meloxicam and placebo in that model. In contrast, meloxicam alleviated lameness to a greater degree in the synovitis pain model compared with phenylbutazone.

"Not all NSAIDs are created equal for every condition and every patient," said Hector. "If a drug is not effective, I would consider switching to a different drug within this class. It's an easy thing to do and worth a try to see if you get a better response. The patient at the end of the day dictates what works, regardless



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Veterinarians need to help horse owners identify equine pain since horses in pain might exhibit "bad behavior" issues such as stopping.

of what a study says."

A comprehensive review on NSAIDs has also just been released and may be a valuable source of information for practitioners: Non-steroidal anti-inflammatory drugs in equine orthopaedics (Jacobs et al. 2022; https://pubmed.ncbi.nlm.nih.gov/35076950/).

Adjuncts and Alternatives to NSAIDs

Some horses are either intolerant to NSAIDs or their pain is not sufficiently managed with NSAIDs alone. Only a handful of other pharmaceutical pain medications that can be used either instead of or in addition to NSAIDs are available for horses with chronic pain.

Acetaminophen: "There is a lot of drama with acetaminophen and liver toxicity, but this is actually a really great drug. It is well absorbed and can be combined with an NSAID," Hector advised.

The dose is 20 mg/kg PO q 12 hr. The tablets can be soaked in water to dissolve them and mixed with a small amount of corn syrup or molasses mixed with grain or alfalfa pellets.

For practitioners who have concerns, Hector recommended performing routine blood work every few months to check liver values. But, she said, this practice is indicated even for horses on longterm NSAIDs.

Gabapentin: This mediation, indicated for neuropathic pain rather than nociceptive pain, is unreliable at best according to Hector, but it is still worth a try.

"Gabapentin is very poorly bioavailable, and responses are extremely variable. Plus, finding the correct dose can take weeks to months," Hector said.

Nonetheless, Hector noted, "I think that gabapentin is always worth a try if cost and availability don't preclude an owner from spending money on something else that has better data behind it. That said, I don't think there are many disadvantages to trying it if it is cost effective."

In Hector's opinion, veterinarians are often conservative with their starting doses.

"Considering gabapentin's poor bioavailability, I believe we aren't using high enough doses," Hector said. "I recommend start at 10 mg/kg PO q 8-12 hr and increase from there depending on the horse's response. And don't give up too quickly! Dose titration can take a long time."

In contrast, Bidwell stops when she reaches 10 mg/kg, saying, "I tend to be more conservative with this medication because I am using it as an adjunct to quiet the nervous system and allow other medications (such as an NSAID) to be more effective. I am cautious with higher doses because of the potential for negative side effects. Gabapentin is effective alone as an analgesic in only 30% of people; I think the same is true with horses. This medication can, however, be useful when combined with anti-inflammatory medications."

Tramadol: While not necessarily endorsing this medication, Hector said that tramadol might be worth a try for horses with chronic pain such as laminitis. The primary analgesic effect of tramadol comes from its metabolite, which horses produce variably or break down quickly. As a result, expect a lot of individual variation with this medication. On the plus side, tramadol is not particularly expensive and is easily administered orally at a dose of 2-10 mg/kg q 12 hr.

"Again, tramadol is one of those drugs that I am happy for someone to try, but I wouldn't necessarily expect a miracle in every case," said Hector. "But if it is a miracle for one horse, that is excellent!"

She added, "That is the thing about managing chronic pain. A drug might not work well (or at all!) in every horse, but if given enough options to try, you may find what works well in one horse. For that one horse, that may result in a huge improvement in quality of life."

Lidocaine Transdermal Patches: "These are useful for horses with neuropathic pain or chronic pain, such as those coming back from a tendon injury," said Bidwell. "Even horses that underwent adequate rehab from an injury often still have persistent pain. There is potentially a neuropathic component to the injury, and the lidocaine patches can address this pain. The patches complement treatment with an NSAID."

According to Bidwell, one should clip the hair before applying the patch directly to the affected area and place a

bandage over the patch, if the location allows. The horse will show clinical signs of pain relief within 30 minutes after application, and that should be expected to last about 11 hours (so change the patch q 12 hr).

"The patches work locally at nerve receptors responsible for pain," explained Bidwell. "There are no systemic effects appreciable with the patches."

Lidocaine patches are also useful for back pain, septic joints and even temporomandibular pain, Bidwell said.

She added, "The biggest challenge with their use in horses is getting the patches to stick appropriately and stay on. Tissue glue can be applied to the edges when dealing with a septic joint, particularly a stifle."

Future of Pain Management

"Unfortunately, chronic pain is underdiagnosed and undertreated everywhere," acknowledged Bidwell.

She added that veterinarians "need to be better at helping owners recognize pain and recognize that older horses have changed needs as compared to younger horses. Good horsemanship (turn-out, appropriate diet, appropriate exercise regimens) becomes more important as horses get older. That, combined with appropriate medications or therapies, can allow horses to live longer with quality of life."

Even when chronic pain is recognized, adequate treatment in a primary care setting remains challenging.

Take-Home Message

"There are no new drugs in the very near future, which means that practitioners need to look outside the NSAID box for others, like acetaminophen or topical options, for local disease processes," Hector said. "It is not easy to treat chronic pain in horses. Veterinarians are becoming interested in some of the new options but seem cautious of things they haven't ever used. Not relying on just one therapy is key, in my opinion." EM

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ISTOCK

Displaced anger can lead to abusive behavior toward coworkers.

Rudeness in the Workplace

The AVMA's webinar about rudeness and discomfort in the workplace can offer you ways to de-escalate tense situations.

By Nancy S. Loving, DVM

Rage is a problem in all industries, especially in this era of COVID-19 and the consequences of rewriting the rules of human engagement. The American Veterinary Medical Association (AVMA) sponsored a webinar about rudeness and discomfort in the workplace by Jen Brandt, PhD, director of Member Wellness and Diversity Initiatives at the AVMA. Brandt emphasized that as veterinarians, we are well-versed in subtle cues of animal behavior; similar cues are demonstrated by our human counterparts.

Animals and people have behavior thresholds where one emotional state crosses into another. Exceeding this threshold results in fight, flight, freeze or fidget behaviors. It is also possible to "trigger stack" through cumulative effects of annoyances. People function well within a window of tolerance, then they are faced with some form of arousal that alters behavior.

One human or animal coping mechanism is through redirection of aggression to something other than the trigger. In humans, such displaced anger is taken out on a less-threatening recipient, perhaps a member of the practice staff. Anger can lead to abusive behavior that is purposeful and meant to control, and it tends to escalate. This can take the form of cruelty, intimidation, guilt, manipulation, derogatory remarks or even physical attack and/or destructive behavior. An abusive person often blames others for their situation.

Thinking of companion animal behavior, aggression occurs from play, fear, confrontation, frustration, self-defense, or pain and discomfort. Human aggression stems from perceived injustice, unmet needs or misaligned expectations.



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When handling pet aggression, it is counterproductive to inflict punishment, force interaction or take the behavior personally, said Brandt. It is best to disengage, remove yourself from the situation, provide distractions such as toys or treats, or have a time out.

The same protocol applies to human anger—don't try to rationalize, explain, excuse or justify. Don't become defensive. It is best to allow emotions to subside and to disengage rather than taking the bait. When possible, put feelings into words to have a chance at a rational discussion.

Preventing Confrontation

Prevention is preferable in all cases. Think about common trigger points with clients and avoid unnecessary provocation. Watch body language cues and address the environment and what is going on around you. The key to deconstructing rudeness or confrontation is to hone de-escalation skills. Brandt suggested:

- Practice reflective listening—paraphrase the person's comment and say it back to them.
- It's more helpful to focus on and label emotions, saying, for example, "I know you are worried, frustrated, upset ..."
- Discomfort on your part might compel a more hurried solution, which might actually create longer-term difficulty in resolving issues.
- It is best to create a time-space barrier, saying, "I want to give this some thought and will call you back (at a specific time)." This allows cooler heads to prevail.
- Recognize that not all situations are resolved to everyone's satisfaction.

Non-verbal de-escalation is also important. Examples are maintaining eye contact, checking facial expressions, and standing tall with head up and shoulders back. Mirror calm and present an open body language with your arms at your sides and not crossed. Speak clearly and confidently and avoid interrupting an upset person. It can help to invite the person to sit down while you offer to take notes of his or her complaint.

The "Rule of Six" relies on making a list of at least six differentials about a person's positive behavior by creating constructive stories about them and running these through your mind. Reflecting on this can empower you and smooth out your own emotional triggers and hot buttons.

Take-Home Message

Rudeness tends to be confined to a small number of people. Remembering that can help you to focus on all the nice people in your practice. EM

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How To Stay True to Yourself in Practice

Regardless of where you are in your career or life, it's worth pausing to evaluate whether you are living the life you want.

By Colleen Best, DVM, PhD

Regardless of where you are in your career or life, it's worth pausing to evaluate whether you are living the life you want. As part of that, you need to know whether you can be your true self at work. This might seem like an extravagant or unnecessary idea, although I'm going to argue otherwise.

When we behave in a way that's not consistent with our true selves, whether on a one-time or a repeated basis, it causes our body to endure stress. This is because our body perceives threat when we behave in a way that's inconsistent with our values. Over time, humans have relied on their ability to detect and respond to threat for their survival—one's ability to see a predator in the environment determines that person's ability to live to see the next day. As such, evolution has helped ensure that we take any threat that we detect seriously.

In the world today, we experience fewer physical threats than our ancestors did 3,000 years ago; however, we do still experience threats related to our social standing, our emotional well-being and our sense of self.

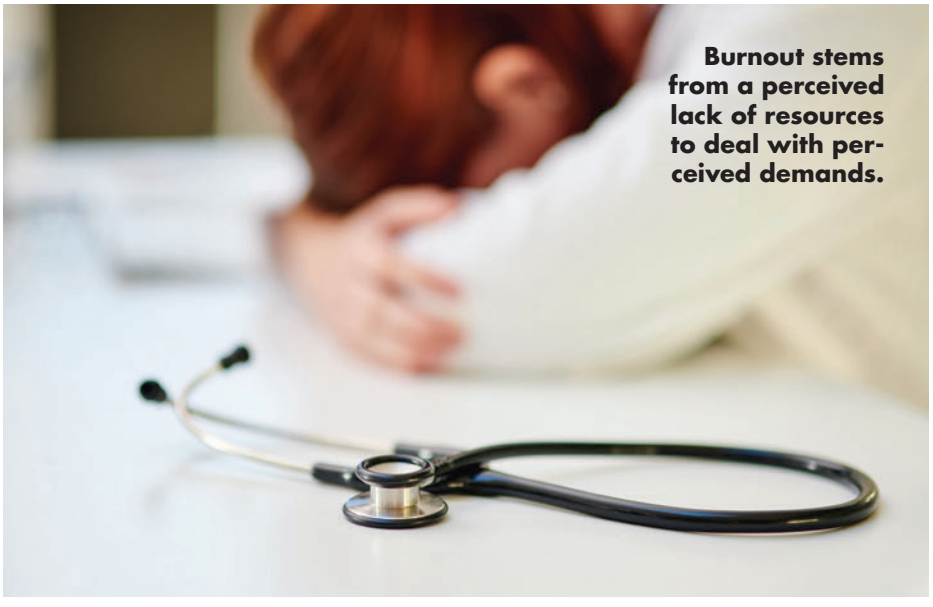
When situations arise in which we feel we cannot act as our true selves, we often experience threats against our emotional

well-being and our sense of self. There are a number of different responses to this type of threat, but all of them require additional energy that leaves us with diminished resources to devote to our chosen activities.

Staying true to ourselves is one way to grow and develop our resilience. In contrast to focusing on ways to manage burnout or recover from compassion fatigue, we can devote energy and resources to being true to ourselves as a critical component of avoiding these experiences in the first place.

Burnout stems from a perceived lack of resources to deal with perceived demands.

When we stay true to ourselves, we support a robust pipeline of resources, which can help prevent the signs and consequences of resource limitation, such as burnout. Compassion fatigue is a combination of burnout and secondary traumatic stress (STS).



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As mentioned above, trauma or threat can occur in response to a number of different situations. Another that relates directly to veterinary practice is when we are asked to do something that is against our set of values; for instance, falsify paperwork or perform procedures we feel are not in the best interest of the animal.

Simply being put in these situations, regardless of whether we act according to our set of ethics or not, can result in moral distress. The consequences to ourselves can be greater when we cannot or do not act in accordance with our own moral code. This again reinforces the need to find ways to practice in alignment with our true selves.

Who Are You?

When we consider what we would need to do to stay true to ourselves in practice, the first question we must address is who we are. What are our values, priorities, purposes and ethical principles? What type of person do we want to be? While these questions might seem simple, answering them is often not easy.

For many of us, the journey through the veterinary medical education system is transformative. We sacrifice many things to pursue our dream of becoming veterinarians. Much of the time, this happens incrementally, in a way that we hardly notice the various parts of ourselves that are lost, or perhaps are simply dormant, during the time we are striving to get into, then graduate, from veterinary school.

There were (and are) benefits to limiting our focus for short periods of intense activity or learning. Given the demands of the program and the academic and extracurricular requirements for entry, it's quite possible that we might not have succeeded if our attentions had remained divided. That said, we must consider the consequences to this narrowing of ourselves. Despite veterinary school being a relatively short part of our overall journey as veterinarians, it shapes the type of people and practitioners that we are and will be in the future.

In my case, I realized that I had lost sight of the person I wanted to be a couple of years after graduation when I went to write an online dating profile. In trying to write a short biography that described what was important to me, the type of person I was, I realized that I had not engaged in many of the activities that I was proclaiming to love in at least eight years. At that point, eight years was over a quarter of my life. I sat there, feeling a bit lost, wondering whether telling strangers that these were things that I loved to give them a picture of me was misrepresenting myself. And yet, how could sharing them be a lie when they were true before, and I certainly did hope they would be again.

I wish I could tell you that from that moment on I began an almost single-minded journey to rediscover (or discover anew) the person that I was and what was important to me—but that's just not what happened. Slowly, though, I did begin to engage with the larger world, and over the past decade and a bit, have found myself being someone that my younger self would recognize.

Learning about ourselves requires intentional exploration and reflection, which can be accomplished in a number of ways. A quick Google search for "how to find your true self" will provide you with a plethora of different avenues to pursue. Feel free to explore those that feel right. Do consider that only you can know your true self, so it is important to turn inward and toward yourself, as opposed to looking to others to answer these questions for you.

Keeping a journal with your thoughts and observations can be a meaningful way to keep track and to monitor your own progress on this journey. It's also important to note that we are always changing, so we need to frequently check in with ourselves and our understanding of who we are to ensure that the qualities we have identified with in the past still feel accurate and relevant.



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Sticking to the Path

Having an idea of who we are is a critical first step on a long path of actually "being" ourselves. How do we boldly and confidently "be ourselves," particularly when we might have colleagues or clients who have different values, or with whom our true selves clash with over certain things?

One of the ways to help ensure that we stick to our paths is to develop robust inward- and outward-facing boundaries. Boundaries are the rules and guidelines we have for how we interact with the world. Given this definition, it's simple to see how we can leverage boundaries to help us stay true to ourselves. We need boundaries to protect us and create space so we can go about the hard work of being that person.

Inward-facing boundaries are those that protect our sense of selves—including our values, purpose, thoughts and intentions.

One of the greatest risks to our ability to be ourselves is the pressure we feel to conform to the expectations of others or of societal norms.

Inward-facing boundaries help us keep in touch with who we are and recognize when our sense of self is being threatened, and we can choose to respond in a way that protects ourselves instead of compromising.

Outward-facing boundaries are those that relate to how we interact with the outside world. From how we chose to spend our energy to the hours we work, outward-facing boundaries are essential because they create space in our lives for us to do the things that matter most.

Another consideration is to cultivate a social circle that fosters your ability to be yourself. A wise friend once shared with me the idea of "islands of sanity," a strategy described by Dr. Meg Wheatley. She described the value of "safe, caring and compassionate spaces for meaningful conversations with others to help us move out of our survival mode and into a more humane mode."[1] These types of spaces, where we are able to engage with others that help build us up and engage fully with ourselves and others, can be tremendous gifts when working toward living our true selves.

Take-Home Message

There is no destination when it comes to being your true self. It is a daily practice. Some days we'll do better than others, and that's expected and OK.

There's a caveat to consider: In some circumstances, it is not safe to be our true selves, whether that is because of the hateful beliefs of others or otherwise. In those situations, awareness of when we turn away from ourselves can help us heal from the damage that results from needing to hide that part of ourselves.

Finally, know that we can get lost in many different parts of our lives, not just work. No matter where we lose ourselves, the path back is the same. It starts with a choice and a commitment to the effort of walking that path. EM

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Could you be doing more in your practice with your ultrasound equipment?

Ultrasound Exams in Horses: Using the Basics To Go Beyond the Basics

This Q & A with Dr. Tracy Norman can help you get more out of your ultrasound machine and exams.

By Stacey Oke, DVM, MSc

Many general equine practitioners feel comfortable with their routine use of ultrasound, typically for lameness or reproductive purposes. Some even feel comfortable using ultrasound for thoracic and abdominal scans (e.g., FLASH, fast localized abdominal sonography for horses). Do you ever wonder, though, whether you could be doing more with this powerful imaging modality to diversify the services you offer to provide better medicine and grow your practice?

At the 2021 American Association of Equine Practitioners (AAEP) Convention in December 2021, a group of expert ultrasonographers came together to offer their advice on maximizing the use of ultrasound in the field. They presented information on how practitioners can better use ultrasound for musculoskeletal, reproductive and even urinary system imaging, as well as tricks and tips for imaging both adult and juvenile thoraces and abdomens.

One of those experts, Tracy Norman, VMD, DACVIM, owner of Valley Veterinary Ultrasound, shared her thoughts on "making the most" of thoracic and abdominal ultrasonography in adult horses. Her presentation focused on case

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selection, patient preparation, equipment requirements and examination technique. Afterwards, Norman kindly spent a few minutes answering additional questions for EquiManagement.

Question: What ultrasound unit best meets the needs of a general equine practitioner and what probes are most valuable?

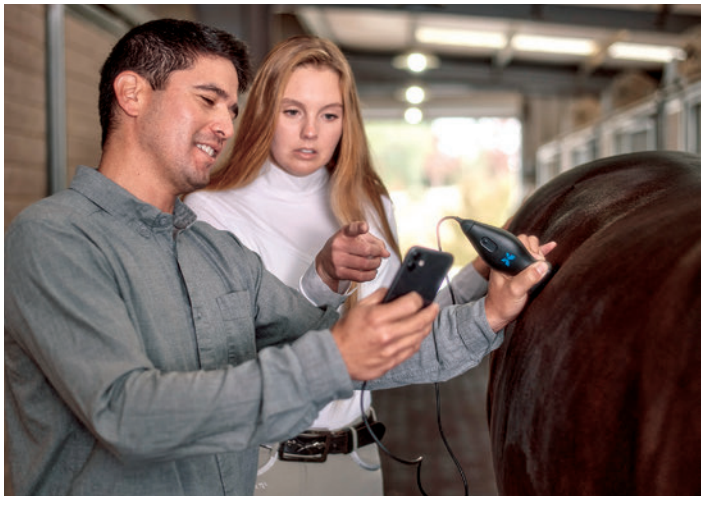
Answer: The focus of the practice and the population of horses in the practice will largely dictate the exact type of unit a general practitioner will require; however, there are some generalities that we can make.

For ambulatory practice, it is good to have equipment that isn't overly bulky or heavy yet is sturdy enough to handle the "rough and tumble" of road life. There are lots of excellent machines out there at all price points, and the ones that are set up in a laptop computer-type format are great for ambulatory practice. A practitioner should look at a variety of machines and see what image look best to his or her eyes and what platform (the layout of the buttons) makes most logical sense. Another important thing to consider is the service plan that comes with the machine.

In terms of probes, it somewhat depends on the focus of the practice, but for most general practitioners, I feel like the repro/transrectal probe and a tendon probe (high-frequency, linear) are most often used. The large, lower-frequency curvilinear probes are used for internal medicine-type scanning, FLASH scans for colic, and upper-level sports-medicine procedures like sacroiliac joints, backs and necks.

The newer portable (i.e., hand-held/phone-based) ultrasound units continue to become more affordable and readily available. Whether a practitioner should get this type of ultrasound unit or a more traditional machine will depend on the individual practitioner's preference.

I personally haven't used the hand-held/phone-based units enough to clearly advise other practitioners one way or another as to whether they are better than a traditional unit or worth the price. That said, the image quality I have seen on some of the hand-held units is impressive, and there is definitely a place for this technology in general practice. For example, the Butterfly iQ+, which is a hand-held system compatible with iPhone and Android, is capable of imaging all of the body systems.



COURTESY BUTTERFLY

Dr. Norman said whether a vet gets a hand-held ultrasound or a traditional unit is personal preference.

Question: Are the same basic probes used for reproduction/transrectal purposes and tendon scans useful for transabdominal and thoracic ultrasound examinations?

Answer: The standard transrectal probe used for early and routine pregnancy detection, uterine evaluations and for tracking ovulation cycles is actually great for thoracic scanning, especially in foals.

Indications for thoracic scanning include fever, respiratory signs, inappetence (especially with a recent history of transport), thoracic pain, sternal edema and Horner's syndrome.

The main things to note are pleural irregularities and pleural fluid. Because of the nature of ultrasound, only the surface of the lung can be evaluated sonographically. For effusions in the thorax, ultrasound is excellent for evaluating the volume and character of the fluid. The heart can be imaged in the ventral fourth intercostal spaces, and broken ribs can also be diagnosed on ultrasound. In fact, an ultrasound examination can often be more sensitive than radiographs for fractured ribs. In addition to pleuropneumonia, neoplasia, fungal infections and viral pneumonias can cause thoracic abnormalities. And *Rhodococcus equi* lesions in foals can be detected sonographically.

The tendon probe can also be used to evaluate the lung surface in foals and adults. In adults, however, if there is pathology (e.g., fluid, consolidation), the tendon probe lacks the depth sometimes needed to see the full extent of the pathology. The tendon probe can image to a maximum depth of about 6 cm and has a narrow scan field.

Tendon probes can be used to evaluate foal abdominal structures in a pinch, but a curvilinear probe is more appropriate. The low-frequency curvilinear probes required for advanced abdominal, thoracic and neck/back scanning are different from the "work horses" of general practice.

Question: If general practitioners are interested in purchasing a low-frequency curvilinear probe, what specific types of examinations could they perform?

Answer: The FLASH exam for trans-

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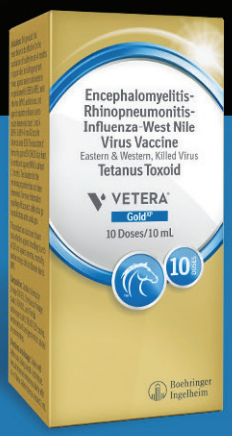


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abdominal imaging of the acute abdomen uses set windows to answer specific questions about potential causes of pain. Generally speaking, it is used by general practitioners in an ambulatory setting to help determine whether a colicky horse should be referred.

Information added to the colic examination by the FLASH exam includes the:

- presence or absence of excess peritoneal fluid;
- presence or absence of fluid distention of the stomach and small intestine;
- thickness of the small intestine;
- presence or absence of bowel in the nephrosplenic space; and
- position of the mesenteric vessels of the right colon.

FLASH can thus help the practitioner determine the likelihood of small intestinal obstruction, small intestinal strangulation, nephrosplenic entrapment, right dorsal displacement, colonic torsion, peritoneal inflammation and rupture of a viscus.

Question: If a practitioner sees enough colic cases and wants to start learning FLASH, is it a good investment to purchase a low-frequency curvilinear probe?

Answer: Absolutely! The FLASH examination adds valuable information to the colic exam. The low-frequency probes can also be used for some sports medicine imaging: sacroiliac injections, necks, backs, examining the pelvis, etc. And if a practice is reproduction oriented, the low-frequency curvilinear probes can also be used for evaluating the fetus later in pregnancy.

Question: When adapting reproductive/transrectal or tendon probes for other purposes, such as the thoraces of foals, do the machine settings need to be altered from what practitioners would typically use for tendons/reproductive/transrectal examinations?

Answer: With any probe, the machine presets/exam type will change when the application changes. This is actually really important; trying to get a good abdominal image with the machine set for musculoskeletal imaging is going to be really frustrating and vice versa. Most, if not all, machines have computer presets that tailor the image processing to the type of image that is being obtained. This is generally designated as "Preset" or "Exam" type.



ARND BRONKHORST PHOTOGRAPHY

The type of probe or probes you use in ultrasound depends on your case load and experience.

Question: What key tips do you have for veterinarians to become more adept at using their machines, expanding their repertoire and increasing the number of services they offer to grow their businesses? General practitioners are busy. Even with wet labs, many come home, get lost on their first few ultrasound exams, can't find what they saw in the labs, get frustrated, then don't do it anymore! I know you recommend practicing as much as possible. Do you have any thoughts on how equine veterinarians can more easily incorporate this "practice" into their practices?

Answer: Again, this very much depends on the focus of practice. The regional and state meetings that have wet labs generally have a wide range of information and are great for folks hoping to get into ultrasound. The more specific groups that focus on, say, lameness diagnosis, tend to have more advanced courses.

If you have access to a low-frequency probe, scan *Every. Single. Colic.* Don't charge for the first couple so you don't feel bad practicing. The clients love to hear that their vets have learned something new and are going to show them for free! I feel that "peeking" in the abdomen or thorax when on a tendon call is tough, and again, I don't really recommend the tendon probe for adult abdomen at all ("it's just a recipe for frustration"). *But* we can take a peek in the thorax for every fever case. I can easily say, "Hey, while we see if this flunixin is going to lower the fever, how about I take a peek in the chest? I learned a new technique at CE and would love to try it out at no charge."

Concluding Thoughts

"An ultrasound examination involves more than just taking the images at the correct anatomic location," advised Norman. "Appropriate case selection will also help veterinarians become more adept at maximizing their use of ultrasound. This means that they need to understand the clinical signs that are best illuminated by specific types of ultrasound. Using a FLASH exam for a horse with chronic weight loss, for instance, is not appropriate, whereas a thorough abdominal ultrasound is. In a horse with a fever of unknown origin, even a brief look in the thorax and abdomen for free fluid can be illuminating." EM

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There is no single recipe for successful equine rehab.

Equine Rehabilitation Basics

There have been great advances in equine rehabilitation over the past decade, but not all modalities have been scientifically proven.

By Nancy S. Loving, DVM

Equine sports medicine has evolved over the past several decades to optimize equine performance and to provide rehabilitation from injury. Just as human athletes are offered a myriad of strategies to help with injury repair, horses have also been afforded the benefit of a variety of therapeutic options. Specific rehabilitation centers are springing up throughout the country to accommodate this fast-developing facet of the equine industry.

Each horse has its individual set of problems requiring attention, so a rehabilitation program is tailored with those specific issues in mind. There is no single recipe for rehab, and there is no guarantee as to the outcome—much depends on the injury as well as the owner's commitment to the necessary duration and logistics of treatment. Progressive stages of rehabilitation and conditioning require monitoring and evaluation using objective criteria. In some cases, diagnostic imaging is helpful to inform about a horse's progress and to develop and modify rehab protocols.

Rehabilitation works best by limiting the use of immobilization as much as possible while also protecting against overuse during recovery. Rest and confinement have a role, but it is important to optimize tissue healing and remodeling, neuromuscular control, coordination, flexibility, strength and endurance so that soft tissue structures are able to function properly as more effort is added to a rehabilitation program.

A dedicated rehabilitation facility usually has an atmosphere conducive to healing, with good ventilation, natural light, optimal ambient temperature and safe footing. Multiple modalities are offered, each with its own set of benefits. Many equine sport venues (USEF and FEI for example) have specific regulatory requirements for use of certain modalities, and this should be considered when managing competition horses.

Massage Therapy

A very basic, non-invasive rehabilitation procedure is massage therapy, which helps to relieve muscle strain, spasms and tension. Relaxed muscles also improve the range of motion of joints and other soft tissue structures, along with the opening of blood vessels to improve oxygen delivery to the tissues and re-

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Stretching exercises improve a horse's flexibility and the range of motion of limbs, neck and back.

moval of metabolic waste products.

Most horses enjoy massage therapy and respond with relaxation, reduced tension and lowering of overall stress.

Stretching, Mobilization and Manipulative Therapy

Mobilization uses passive range-of-motion techniques to restore movement to soft tissue structures and joints to reduce pain and improve function.

Stretching exercises improve a horse's flexibility and the range of motion of limbs, neck and back, as well as having a role in increasing core strength. Passive stretches can be accomplished with carrot treats to encourage a horse to bend its neck and trunk.

Stretches are also achieved using elastic resistance materials such as Equiband or with side reins or long lines to stimulate a horse to engage core muscle groups.

The use of cavalletis or ground poles also helps a horse improve proprioception, strength in the abdomen, back and limbs, and to increase joint range of motion. Studies show that the best flexion and hoof elevation is achieved when poles are about eight inches off the ground.

Chiropractic

Chiropractic techniques provide higher velocity manipulation of tissues, particularly in the spine and tissues along the back. These actions are reported to improve flexibility, relieve muscle tension and lessen pain.

Care must be taken to apply mobilization and manipulation to address a specific diagnosis, and to refrain in the case of fracture, joint disease, bone infection, neurologic disorders, cancer or bleeding disorders.

Controlled Exercise

Hand walking is the gold standard for getting an injured horse moving without concussion impact or trauma to musculoskeletal structures during prolonged layup. This exercise begins with five to 10 minutes and is slowly increased as injury monitoring and progress allows. Gradual increases in duration and intensity of exercise enable soft tissues and bone to heal without undue stress. As rehab progresses, a horse might be ponied from another horse, and usually by three to four months a horse can be ridden under saddle with progressive increases in pace and time.

Negotiation of slight inclines, going both up and down, is also helpful for muscle strengthening of rear limbs.

Therapeutic Taping

The use of athletic tape is becoming more common on horses with the objective of reducing pain, improving proprioception and improving muscle activation. Lifting the skin with tape might decompress underlying blood, lymph and nerve vessels while also stimulating mechanoreceptors in the skin.

Heat and Cold Therapy

Cryotherapy (Cold Therapy): An acute injury or surgery—within the initial two to three days—often benefits from cold therapy to decrease metabolic demands and to reduce pain, inflammation, swelling and edema, and to limit hemorrhage. Soft tissue structures—muscles, tendons, ligaments—respond especially well to cold therapy.

Cold can be delivered via cold water hosing, with ice water immersion or with simple devices such as commercial ice boots, cold packs or frozen vegetable packs placed over the injury and wrapped into place. It is important to

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place a layer of light fabric over wetted skin to prevent skin freezing yet still allow cold to penetrate. Treatment is applied for 20-30 minutes and repeated every two to four hours during the initial days of injury.

Commercial devices (such as Game Ready or Soft-Ride Ice Spa) that use a mechanical pump to deliver cold with or without compression work exceptionally well to reduce edema and to improve blood circulation.

Heat Therapy: Once inflammation has settled down from an acute injury, a next step is using heat therapy to improve circulation, dilate blood vessels, reduce edema and amplify metabolic processes (including nutrient acquisition into tissues). Metabolic rate in tissues is increased two to three times when tissue temperature is warmed to 104–113 degrees Fahrenheit. Higher temperatures result in tissue damage and horse discomfort.

Heat therapy applied for 15–30 minutes is particularly useful for muscle strain or spasms, tendonitis, bursitis and arthritis. Tissue stretch, elasticity and joint range of motion improve with warmth. This is accomplished using heat packs, heat blankets or achieving deep heat with therapeutic ultrasound.

Therapeutic Ultrasound

Acoustic energy used at higher frequencies of ultrasound than what is used for diagnostic purposes is able to generate heat. Applied to an injury, this therapy warms deeper tissues and increases metabolic activity to depths beyond 5 cm for repair of wounds, muscles and tendons.

In addition to tissue thermal changes, there are non-heating effects such as increased blood flow, increased cell membrane permeability with amplified movement of blood and lymph through the area, and collagen synthesis and tissue regeneration.

Therapeutic ultrasound further improves joint range of motion, as well as mobility and repair of connective tissue. It is also reported to reduce pain by as much as 47% (in human studies), but similar results are not yet reported for its use on lower limbs of horses.

Therapeutic ultrasound can also be used for its beneficial heating effects on soft tissue structures prior to exercise or for mobilization procedures. Heating effects are relatively short-lived—i.e., in minutes—so to optimize advantages, perform stretches immediately following therapeutic ultrasound.

For best results, clip hair away and use ultrasound gel for optimal transmission of sound waves from the transducer.

Acupuncture

Acupuncture has proven beneficial effects to help ameliorate pain. Relief from discomfort enables implementation of additional rehabilitation techniques to improve range of motion and flexibility.

Extracorporeal Shock Wave Therapy (ESWT)

Another form of generating pressure waves to target a specific injury site of soft tissue or bone is with the use of extracorporeal shock wave (ESWT). This therapy is used to treat ligament or tendon injuries and to stimulate remodeling of bone. It is said to improve development of capillaries to optimize blood flow to an area and increase growth factors to encourage healing.

Shock wave treatment is known to have analgesic effects for up to four days, so it must be used cautiously in advance of competition and regulatory requirements.

An accurate diagnosis is important for best results so that ESWT can be targeted specifically to an area of concern.

Low-Level Laser Therapy (LLLT)

Use of infrared light lasers to stimulate healing of wounds and treatment of soft tissue injuries and osteoarthritis is currently in vogue.

Laser is an acronym for Light Amplification by Stimulated Emission of Radiation. Light emitted from a Class 3 or 4 laser is said to stimulate release of neurotransmitters that activate specific cell functions to decrease inflammation and pain. Good results have been reported for muscle and tendon damage and for healing wounds. It is also reported to have beneficial effects when used concurrently with stem cell administration.

Clipping and cleaning the area for laser treatment is recommended to

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Most horses enjoy massage therapy and respond with relaxation, reduced tension and lowering of overall stress.

ensure best light penetration. Dark hair color tends to block laser light. The wavelength used depends on skin color, as well.

Transcutaneous Electrical Nerve Stimulation (TENS)

Surface electrodes placed on a horse's skin are able to transmit electrical current to stimulate peripheral nerves for pain modulation.

Electrical stimulation is provided as a) high frequency/low intensity current; b) low frequency/high intensity current to stimulate acupuncture points; or c) intense TENS as high frequency/high intensity.

TENS exerts its effects via gate control, i.e., stimulation of large, myelinated A-beta fibers that also synapse within the spinal cord in the same place as pain-transmitting, small, unmyelinated C-fibers. This then blocks pain transmission. Another effect is achieved though release of endorphins into cerebrospinal fluid.

While plenty of research has identified successful use of TENS in humans, there isn't yet evidence of efficacy in horses. To ensure best results, clip the hair and apply ultrasound gel beneath the electrode pads.

Aquatic Therapy

Many rehabilitation centers are equipped with specialized pools or tanks for horse immersion to allow locomotion without impact. This helps retain aerobic cardiovascular condition without traumatic concussion on bones, joints and limbs. The water temperature can be controlled to optimize what is best for a particular injury and for the horse's well-being.

When using a variable-speed underwater treadmill, a horse's buoyancy in water allows some weight bearing but not so much as to cause pain on distal limb structures. The hydrostatic pressure of water helps with muscle strength, joint range of motion, motor coordination and postural control for balance.

Water resistance, which is 12 times greater than treadmill resistance in the air, provides a form of strength training of muscles. Hydrojets can further increase drag on limb movement for additional strength training. Water depth determines how much benefit is gleaned from use of an underwater treadmill.

Vibration Plates

Whole body vibration is used with the objective of improving muscle, postural and core strength and to stimulate bone osteogenesis. It should be noted that studies on vertical vibration frequencies have demonstrated increased cartilage degeneration in cases of osteoarthritis. Horizontal oscillatory vibration does not exhibit those detrimental effects.

The biggest benefit reported to date is a significant increase in the cross-sectional size and symmetry of the multifidus muscles of the back with twice daily, 30-minute application for 60 days. By improving multifidus muscle function, a horse might achieve greater spinal stabilization and postural muscle ability to help deter osteoarthritis.

Hyperbaric Oxygen Therapy (HBOT)

A specialized chamber increases atmospheric pressure to deliver additional oxygen to the tissues to aid with tissue healing. Blood vessels can increase in size, number and function in soft tissues and bone; swelling and inflammation are controlled; white blood cells amplify protective actions against infection; and anaerobic bacteria are adversely affected.

Oxygen intake by a horse is doubled with HBOT, thereby improving oxygen uptake in the tissues. HBOT is an adjunctive treatment to other medical treatment used to manage illness or injury.

Take-Home Message

There are many different rehabilitation modalities that are now being used in horses. Some have years of scientific studies to back up their efficacies, and others are still in the process of being investigated. Work with an experienced or boarded equine therapist to get the best results for your clients' horses. EM





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Even if you practice good medicine, you can get sued.

Avoiding Malpractice Complaints

While veterinarians are committed to providing the best possible care for horses, actual outcomes are not always fairytale endings.

By Cynthia G. Mackenzie, DVM, with Katie Navarra

In human medicine, lawsuits are common after a patient experiences further injury or death after receiving medical care. In August 2011, the *New England Journal* published "Malpractice Risk According to Physician Specialty," a study that revealed that 99% of physicians face a malpractice lawsuit by age 65.

Equine practitioners are fortunate to face far fewer malpractice claims than human doctors. The AVMA Trust-sponsored PLIT program receives an average of 3,500-4,000 notices of potential or actual claims each year. Of those complaints, approximately 5% are equine-specific incidents. Although they represent the smallest percentage of total annual claims, equine complaints result in higher payouts in contrast to other insurance classes, such as small animal.

Importantly, equine complaints also tend to result in litigation more often than other classes of animals due to the higher value of these patients. While incidents related to pre-purchase exams are the most common cause of equine claims seen by the AVMA Trust, the program routinely identifies other situations as repeated sources of equine claims, complaints and lawsuits. These include:

- Consent and miscommunication issues
- Rectal tears
- Complications related to anesthesia, sedation and castrations

While equine veterinarians have a

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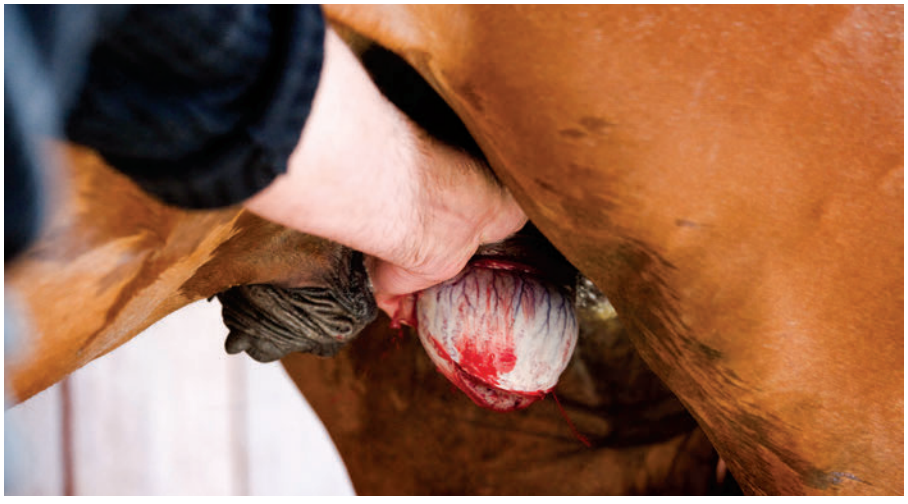


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ARND BRONKHORST

Client complaints about castration complications are among the top issues that result in malpractice lawsuits.

lower probability of being subject to a malpractice lawsuit, they should still be prepared in the event they are faced with one.

Understanding what malpractice is and how to implement strategies to protect yourself and your practice is critical.

Defining Malpractice

Malpractice is defined as the failure of a professional person to use such reasonable skill and diligence as are ordinarily expected of careful, skilled and trustworthy persons in his or her profession.[1] A veterinarian is held to a performance level equal to that of others in a similar practice type and with similar training, education and experience. What other veterinarians would find reasonable is termed "Standard of Care" (SOC).

Professional liability insurance responds to allegations of negligence or practicing below the standard of care. Veterinarians who receive allegations of negligence or a malpractice complaint should inform their malpractice insurance carriers immediately.

Minimizing the likelihood of veterinary professional liability (also known as malpractice) claims and license defense complaints focuses on four key principles:

1. Recognizing the importance of complete medical records
2. Keeping people and patients out of harm's way
3. Practicing good medicine
4. Using enhanced communication skills

Following these principles will aid in avoiding dissatisfied clients and subsequently reduce the chance of a malpractice claim or board complaint. Let's look at each of these in more detail.

Maintain good medical records: If you are accused of malpractice, your medical records are your defense. Equine practitioners should have a method of completing and maintaining medical records, whether mobile or in a hospital setting. Complete and legible medical records are imperative. Remember, from a legal perspective, if it was not written down, it did not occur.

Medical records are an open component of your communication practices. Documentation should show sound professional judgment based on information available at that time. *Check with your state veterinary practice act as to record-keeping requirements*. A good rule to follow is that any veterinarian who reads a medical record should be able to pick up where the last veterinarian left off with treatment of that patient.

The following items should be included in medical records:

- Written consent forms
- Anesthesia logs
- Surgery reports
- Physical exam findings
- Daily boarding report cards
- Diagnostics recommended and declined by owner
- Lab results
- Estimate sheets
- All communication, including texts, e-mails, voice messages and verbal conversations

The quality of care provided will be judged on the documentation contained in the medical records. The practice owns these records, including original radiographs. The client of the records is entitled to copies upon request within a reasonable time period. Be sure to consult your state veterinary practice act for specifics in regard to providing records to owners.

Keep clients and patients safe: It's critical to keep people and patients safe. Human injuries do affect the professional liability program when it comes to malpractice. This is especially true in equine practice where it is still considered the standard of care for clients to restrain horses or assist with procedures. The size of horses and their flight nature can make treating horses more dangerous, unpredictable and challenging.

It is the responsibility of the veterinarian to ensure the safety of everyone involved in or around at the time of a veterinary procedure. To reduce the chance of a person getting hurt, appropriate staff training and having staff present to restrain patients, rather than allowing clients to restrain patients, is preferable. Use chemical restraint, if necessary, to reduce the chance of an injury as well as a worker's compensation claim if an employee is injured.

Practice good medicine: Equine veterinarians do their best to practice

good-quality medicine. Even when their best judgment is exercised and appropriate protocol is followed, unfortunate outcomes can happen. Some are simply the result of inherent risks, and yet might be alleged by the client as mistakes. Veterinarians and their staffs are human, and medical errors will happen, which is why it is so important to protect yourself with appropriate malpractice coverage.

Continuing your education and practicing cutting-edge medicine will ensure that you stay current on the latest treatments, guidelines and techniques and will also demonstrate to your clients a commitment to providing the best care possible. It is essential to continually familiarize yourself with new drugs, new procedures, new vaccines, new protocols and new guidelines. It also is important to refer a patient when the appropriate expertise or equipment to perform a needed procedure is not available. Always recommend what is in the best interest of the patient.

Enhance your communication skills: According to O'Connell and Bonvicini,[2] poor communication and malpractice claims are correlated. These questions can be a good place to start in evaluating your communication with clients:

- Do you explain the risks versus benefits of a recommended procedure or drug?
- Do you consistently get client consent?
- How do you deliver bad news?
- How do you handle an upset client?
- How do you handle conflict?
- Do you tell the client the truth if a mistake is made?
- Do you use reflective listening?

Veterinarians should always explain the risks versus benefits of a recommended procedure or drug and obtain owner consent.

Communication in practice can occur across different levels and between the veterinarians, clients and staff. Breakdowns in communication can occur in many places. One specific area in equine practice where breakdowns in communication can have significant repercussions is pre-purchase exams (PPE) for absentee buyers. The unique veterinarian-client-patient relationship that exists in the equine industry oftentimes leads to the increased likelihood of miscommunication.

With many PPEs, the buyer's agent or trainer is in communication with the seller rather than the veterinarian. When a veterinarian is presented with a PPE for an absentee buyer, it's important to consider these increased communication challenges. The veterinarian should still provide a thorough exam and the best possible picture of the horse's serviceability.

By making an effort to keep the buyer completely informed, the likelihood of complaints once the buyer examines a new purchase in person for the first time can be reduced. Technology can play a useful role in this effort, for example, by including videos and pictures in your report. Be sure that the final report is sent to the absentee buyer in a timely manner either by certified mail or, if emailed, utilize the "read receipt" function to ensure that the report is received.

The Bottom Line

Veterinarians are committed to providing the best possible care for their equine patients. There is nothing more satisfying than being able to help a horse heal from an injury or overcome illness. Unfortunately, the outcome is not always a fairytale ending. While most horse owners recognize and accept this possibility, some will not. Those clients might file a malpractice lawsuit. Therefore, always maintain appropriate levels of professional liability insurance coverage to help provide a bubble of protection around your ability to practice veterinary medicine.

Staying current on the latest practices, maintaining impeccable records, clearly explaining details to clients by using good communication skills, and keeping people and patients out of harm's way are the best ways to protect yourself and your business in the unfortunate event that a lawsuit is filed. EM

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Many owners don't understand the nutritional needs of the horses in their care.

Expert Nutrition Advice for the Equine Expert

Here's how and why partnering with an equine nutritionist benefits you, your clients and your patients.

By Stacey Oke, DVM, MSc

For adrenaline junkie-type veterinarians, nutritional management isn't nearly as satisfying or exciting as a good old-fashioned abscess, laceration or dystocia. That said, nutrition directly affects equine health, behavior, performance and welfare. Therefore, it could be construed as one of the most important aspects of horsekeeping.

"Surveys show that veterinarians rank highly as nutrition resources for owners, and nutrition experts strongly encourage general practitioners [to] perform a nutritional assessment as part of every horse's routine physical examination," said Catherine Whitehouse, MS, a nutrition advisor for Kentucky Equine Research.

The American College of Veterinary Nutritionists has an extensive list of competencies on its website (go to ACVM.org and search "equine competencies"). That organization stated: "Equine veterinarians should be able to perform the following functions competently upon graduation." Even quickly perusing this list might be an eye-opening experience for veterinarians. The list includes assessing the horse, the feed and feeding management, recommendations and monitoring (and each topic has a list of six to 12 things that the veterinarian should be able to do).

Having deficiencies in some of these areas is understandable. As Whitehouse pointed out, "Veterinary students typically receive little nutrition training. Their basic nutrition education is generally covered in only one or two courses."

Highlighting the importance of this part of equine practice, the April 2021 edition of *Veterinary Clinics of North America: Equine Practice* was devoted to equine nutrition. One of those articles,

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Having a discussion about a horse's weight and nutrition with a client can be difficult for a veterinarian.

entitled "What would be good for all veterinarians to know about equine nutrition," relayed data showing that most veterinarians had not recently (in the past year) participated in any nutrition continuing professional development, and that many veterinarians felt dissatisfied with the level of equine nutrition education they received in school (Harris and Shepherd, 2021).

"Limited nutrition-based continuing education resources and time are two culprits impeding dissemination of nutrition information," Whitehouse noted. "While owners have the opportunity to ask for nutrition advice at routine care appointments, veterinarians often don't have time to answer all of an owner's questions at that one appointment. Nor do they have the opportunity to call them later to follow up."

For those reasons—time and knowledge—equine veterinarians could benefit from the assistance of an equine nutritionist.

How to Partner with a Nutritionist

To demonstrate how veterinarians and nutritionists can effectively partner, let's consider the following scenario:

Your patient is Darla, a 7-year-old Thoroughbred/warmblood cross mare. The owner has aspirations of starting to compete at the novice level of eventing within the next few months. The mare's currently body condition score (BCS) is approaching 7 out of 9, but the owner thinks she is perfect.

The owner is wondering how much more she should feed her horse to meet her soon-to-be increased energy demands. How much concentrate and what kind? Does she need to add a ration balancer? Is there enough protein in the horse's diet? How can she protect the horse from stomach ulcers? What supplements does she need, such as electrolytes, coat and hoof conditioners, joint supplements? The list goes on and on.

Here are some thoughts by two nutritionists on how veterinarians can begin to approach this situation.

Step One: A Complete Physical Exam

As stated above, nutrition is an aspect of medicine that directly affects horse health. It should therefore be treated with the same importance as a lameness examination. Thus, your first step in addressing nutrition-related issues needs to be a complete physical examination.

The full physical exam ensures the horse has no underlying conditions such as lameness, equine asthma, myopathy (e.g., polysaccharide storage myopathy type 1 or 2), an underlying endocrinopathy (such as equine metabolic syndrome or pituitary pars intermedia dysfunction, aka equine Cushing's). Recognition of any of these (or other) underlying conditions will alter your approach to nutrition advice.

For simplicity, let's assume our horse, Darla, is sound without evidence of any underlying morbidities and has good dentition. With a BCS of 7, however, the horse is clearly overweight.

"This is not a surprising finding these days as the equine obesity epidemic mirrors that in humans," said Whitehouse. "While broaching weight issues with owners who believe their horses are perfect can be challenging or even downright awkward, it's important to address the elephant in the room for optimal equine health and performance."

Excess condition/obesity is a leading nutrition-related concern, particularly in the leisure and sporthorse disciplines. Excess body weight, Whitehouse said, negatively affects joint health, fitness level and stamina, all of which Darla and her owner need in order to to successfully compete even at a novice level.

Step Two: Body Condition

"The body condition scoring system most prevalently used for horses, developed by Dr. Don Henneke, revolves around both the visual *and tactile* appraisal of fat cover on six different anatomical areas of the horse: over the top of the neck, around the withers, down the back, around the tailhead, over the ribs and behind the shoulder. After evaluation of all six areas, a score from 1 to 9 is assigned," said Jennifer Zoller, PhD, extension horse specialist in the Department of Animal Science at Texas A&M University.

Ideally, working horses should have a

body condition score of 5.

"Darla has a BCS close to 7," noted Zoller. "To reach her optimal BCS, we need to decrease the amount of energy in her diet. This can most easily be accomplished by reducing the amount of concentrate or supplements being provided or changing the type of concentrate to better meet her needs."

In Whitehouse's opinion, the three biggest barriers to weight loss are that owners: 1) do not appreciate how overweight their horses are; 2) have limited knowledge regarding the different categories of workloads (light, moderate, heavy, very heavy); and 3) do not know the nutrient requirements for those different categories.

An equine nutritionist can help by providing a favored BCS chart to review with owners (don't just hand it to them!).

Zoller recommended the body condition score chart from Texas A&M AgriLife Extension (https://vetmed.tamu.edu/files/vetmed/vmth/laminitis/Equine_Body_Condition_Scoring.pdf). Kentucky Equine Research also offers a downloadable body condition score chart. Go to KER.com and search "body condition score chart."

Step Three: Strip Down the Diet

This owner is super enthusiastic and wants to dress up her horse's ration, adding in all sorts of "extras." Encourage your owners to take go back to the basics: forage.

"The foundation of any horse's diet, regardless of activity level, should be forage. It's by far the most important component of a horse's diet," said Zoller.

According to Zoller, not only can forages provide many of the necessary nutrients a horse requires, they can also:

- help reduce the incidence of ulcers;
- improve gut health (the intestinal microbiome);
- support dental health; and
- reduce the incidence of negative behaviors such as cribbing, weaving, etc.

"Unless there are exceptional circumstances, most horses need an absolute minimum of 1% of their body weight per day in forage on a dry-matter basis," emphasized Whitehouse.

For Darla, a horse we know is over-conditioned, Whitehouse recommended feeding between 1.5 and 1.8% of her body weight in moderate-quality grass forage.

Darla probably weighs about 1,400 pounds. Feeding 1.8% of her body weight in forage is 24 pounds of forage per day. This approach assumes you have accurately estimated the horse's body weight and that the owner is actually weighing the hay using some sort of scale. Counting flakes or "guesstimating" forage weight is not sufficient. For body weight estimations, use a weight tape or one of the available body weight calculators such as the University of Minnesota's Healthy Horse App. (You can download it from Apple or Android app stores.)

You also need to consider the quality of the hay being offered. You don't want to offer less than about 1.5% of body weight in forage, but if the horse—like Darla—needs to lose a lot of weight, then the horse needs a lower-quality hay (see sidebar page 84).

"Forage quality refers to the digestible energy or nutritional value of a hay," Whitehouse said. Lower-quality hay is higher in fiber and often harvested at a later stage of maturity so it has lower digestibility and is therefore lower in calories."

Zoller added, "When comparing types



Pasture Is Forage

When determining forage intake, be sure to consider pasture access! Overweight horses can consume an alarming amount of energy in just a short time.

"A horse will consume roughly 2-3% of its body weight in forage given unrestricted access," warned Jennifer Zoller, PhD, extension horse specialist in the Department of Animal Science at Texas A&M University. "This means that there are many 'easy keepers' out there who can have a high BCS on pasture alone."

An extension agent can help you calculate how much energy a horse is consuming based on the amount of time it is turned out and how heavily the pasture is grazed. This will then allow you calculate how much additional forage that horse requires.

Some horses might not require any additional forage. In fact, Zoller said, they might require a grazing muzzle or dry lot confinement for a portion of the day to restrict intake and facilitate weight loss.—*Dr. Stacey Oke*

of hay—bermudagrass hay to alfalfa, for example—certainly the alfalfa is going to be higher in nutrient value and thus would be termed higher quality. That is not to say that the bermudagrass hay is *bad*—simply that the horse will get more nutrients from the alfalfa. Feeding a bermudagrass hay is perfectly acceptable, and bermudagrass hay is prevalently fed to horses in my home state of Texas as well as many other areas across the U.S."

It is important to appreciate that not all horses require high-quality forage, but all horses do require *hygienic* forage. A lower-quality hay is less nutritious but still must be free from mold and dust.

While recommending a moderate-quality forage for Darla is appropriate, Zoller noted that selecting forage is always a balance between need and availability. An equine nutritionist can help you find a reputable producer in your area.

Zoller said, "While veterinarians are capable of sourcing hay, time constraints, the size/area of their practice, etc., can certainly have a big impact on their ability to locate appropriate forage. Local extension agents can be great resources to both veterinarians and horse owners as they typically have knowledge of hay producers in the area. Many county offices also have forage sampling equipment available, and often county agents can assist in the sampling and forage analysis interpretation."

Step Four: Concentrate on Concentrates

Many owners do not appreciate that their horses are overweight. This problem is compounded by the fact that many owners view and feed their horses as elite athletes when in fact the horses are not! As a result, owners want to feed concentrate feeds when their horses do not require the extra energy.

"In the scenario above, I would estimate Darla's workload to currently be light, about one to three hours per week of light riding, maybe moving more toward moderate, which is three to five hours per week of moderately strenuous exercise," Zoller said.

Darla, being overweight and not performing at a particularly taxing level, does not require concentrate feed, but the owner is likely going to ignore this advice and offer one anyway.

"A ration balancer can be an acceptable option for the owner that insists on providing pellets," said Zoller. "Ration balancers are formulated to provide additional protein, vitamin and minerals. They are typically lower in energy than most complete concentrates, which is ideal for Darla."

Whitehouse added, "A balancer is a great way to supply quality protein (amino acids), vitamins and minerals, especially if a lower-quality hay is being offered."

Zoller encouraged vets to educate owners on the positive aspects of forage rather than focusing on concentrates. "Horses are designed to be continuous grazers of forage, and forage alone can certainly meet the needs of horses at maintenance and light activity," she said.

Additional Ways an Equine Nutritionist Can Help

Darla was a pretty straightforward example of feeding a horse that is overweight but otherwise healthy. But even the slight modifications in diet recommended above will make a huge impact on her performance and health.

Even with this simple example, the benefits of using an equine nutritionist can easily be appreciated. For more complicated situations, such as horses with insulin dysregulation/resistance, equine metabolic syndrome, tying-up or a gamut of other nutrition-related conditions, your nutritionist can provide a wealth of valuable information.

"We have the time and expertise to conduct a detailed nutrition consultation to understand the current diet and how the horse is being managed," said Whitehouse. "With this information, we can then suggest an appropriate diet based on evidence-based recommendations that take any underlying medical conditions into consideration. The veterinarian-nutritionist team is vital in treating nutritionally related diseases." EM

ANADA # 200-332, Approved by FDA

Butorphic® ℞ IV

(butorphanol tartrate injection)

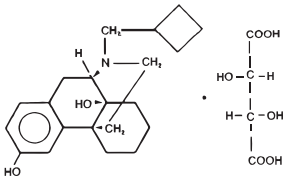
CAUTION

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

DESCRIPTION

Butorphic (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-dihydroxybutanedioate (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 Butorphic 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.

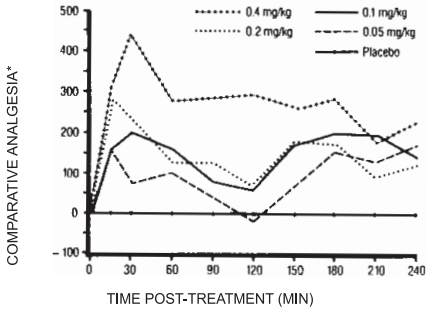
Equine Pharmacology

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

Butorphic (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

Butorphic 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 Butorphic 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

Butorphic (butorphanol tartrate) Injection, 10 mg base activity per mL.

NDC 59399-112-20 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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Most Rotavirus fatalities occur in foals 3 months of age or less.

GETTY IMAGES

Rotavirus Update

Management of horses, environment and using proper biosecurity helps alleviate high Rotavirus issues.

By Nancy S. Loving, DVM

The Gluck Equine Research Center in Lexington, Kentucky, held a seminar on equine Rotavirus in July 2021. A number of interesting facts were elucidated that have practical applications to equine practice.

For starters, the incidence of equine Rotavirus A (RVA) tends to occur predominantly in foals ≤6 months of age, with fatalities occurring mostly in foals ≤3 months. From age 6–60 months, the incidence is 4-6%. Rotavirus is transmitted via the fecal-oral route, resulting in diarrhea with or without colic.

There is a conditionally licensed killed vaccine against the G3 genotype, but currently the G14 genotype is on the rise at an overall incidence of about 16% of cases. Even in vaccinated mares, a central Kentucky study identified that of 21% of the foals with Rotavirus, 26% were infected with the G3 strain and 74% with the G14 strain.

Watery diarrhea develops in foals 24-72 hours old. Damage to the brush border of the intestinal epithelium results in limited production of lactase to digest milk. A foal then loses nutritional energy while milk fermentation causes bloat, pain, gastric reflux and ulcers. Additional complications can develop, such as pyloric/duodenal stenosis and potential rupture.

Many practitioners rely on heavy antibiotic use to manage these cases. While antibiotics don't necessarily change the disease trajectory, they are important to address gastrointestinal inflammation and to reduce translocation of bacteria that can result in septic arthritis and other opportunistic bacterial systemic disease that might overwhelm a compromised foal.

Another newly identified form of rotavirus is Rotavirus B (RVB), often associated with overeating disease. While RVA is the most common rotavirus affecting horses, in 2021, RVB cases started cropping up in foals two to five days old suffering from diarrhea and dehydration, especially in February and March.

At the seminar, Feng Li, DVM, PhD, William Robert Mills Chair in Equine

AnaSed® Injection

(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® 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 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 consumption.

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® 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® 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® 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®'s use in pregnant Cervidae. Avoid use during breeding season.

Cervidae should be observed closely until all of the sedative effects of AnaSed® are gone.

Care should be taken at all times when administering AnaSed® 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.

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ARND BRONKHORST PHOTOGRAPHY

Thoroughbred farms changed biosecurity practices to reduce the incidence of Rotavirus in foals.

Infectious Disease, Gluck Equine Research Center, spoke about the discovery of RVB, which might have originated from ruminants.

David Horohov, PhD, director of the Gluck Equine Research Center and chair of the Department of Veterinary Science, described work in progress at Gluck to develop a subunit vaccine for RVB since this viral strain doesn't grow well enough *in vitro*, making it difficult to produce antigens.

In a 2021 foal diarrhea study conducted by Emma Adam, DVM, PhD, DACVIM, DACVS, of the Gluck Equine Research Center, RVB was detected in 19/84 study foals. Of the 19, clostridial overgrowth was identified in 16, of which 10 were sick. Of the 84 study foals, 66 foals were positive for *C. perfringens*.

There is a contrast in RVA signs compared to clostridial diarrhea, which has a low volume and is dark and bloody, potentially leading to circulatory shock. *C. perfringens type A* is ubiquitous in the soil, and in many cases foal feces are loaded with Gram positive rods. The outcome of the study noted that *C. perfringens* and *C. difficile* are found in healthy and sick foals.



ARND BRONKHORST PHOTOGRAPHY

Rotavirus B (RVB) cases are on the rise in Kentucky; RVB might have originated from ruminants.

Management of Sick Foals with Diarrhea

A discussion on management of sick foals on the farm is all-important to an equine practitioner. Laurie Metcalfe, DVM, of Rood & Riddle Equine Hospital in Lexington, and Scott Bailey, DVM, MS, DACT, resident veterinarian of Claiborne Farm in Lexington, both emphasized key factors in managing foal diarrhea:

- Use of hyperimmune plasma containing *C. perfringens A*, especially if given within the initial 12 hours. It can be given intravenously with other hyperimmune plasma, or 200-300 ml administered orally via a nasogastric tube.
- Supportive care is essential. Metcalfe stressed that without treatment, a young foal with Rotavirus isn't likely to survive. An intravenous catheter and intravenous fluids with 2% dextrose are important for care.
- Limit nursing immediately via a muzzle to decrease milk consumption that creates osmotic diarrhea due to Rotavirus damage to small intestinal villi and absorptive capacity.
- Antibiotics are initiated, especially if a foal is less than 2 weeks old, to protect against septic arthritis: PPG (44k IU/kg IM bid) and amikacin (25 mg/kg IV sid). Some use metronidazole to target *Clostridial* species, but others don't; yet it does have some anti-inflammatory properties for the bowel.
- Use gastro-protectants such as Bio-Sponge, sucralfate, GastroGard and probiotics. It is noted that the gut

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One farm foaled all mares outside and eliminated human intervention whenever possible.

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takes seven to 14 days to heal, so this treatment should continue for sufficient time.
- Lactaid to address lactose intolerance and to help with milk digestion
- Pain control is also important.

A thermo-microchip (EquiTrace) inserted into a day-old foal allows the readout of body temperature on an app without having to touch a foal. This is critical to biosecurity as well as reducing stress on a foal due to restraint for rectal temperature readings. It also reduces the manpower necessary to hold the foal, acquire a temperature reading, record and report the data.

Many of these Rotavirus cases are difficult to manage on the farm due to ileus that results in intestinal cramps and colic that is poorly responsive to analgesic medications. Complete nursing restriction and NPO might necessitate intravenous nutrition and continuous rate infusion (CRI) of fluids. Round-the-clock monitoring and treatment are best accomplished in a hospital setting.

Metcalfe also pointed out some potential problems related to a Rotavirus outbreak:
- Isolation units at the hospital filled to capacity
- Gastric or duodenal ulcer rupture due to outflow obstruction, a classic sequela to Rotavirus
- Morale of staff and veterinarians suffers from intensive treatment, especially of many foals.
- There is a need for consistent and aggressive biosecurity.
- Negative impact on ability of sick foals to thrive due to being underweight and difficulty in catching up with healthy foals

With good supportive care, most foals can survive. The protocol for RVB is comparable to RVA treatment.

Treatment Costs of Rotavirus

Gerry Duffy, manager of Stonerside Farm for Godolphin, emphasized that costs associated with foal sickness from Rotavirus can mount up in dollars as well as other direct and indirect costs. As an example, management of 14 sick foals treated for four to seven days amounts to nearly $50,000 when factoring in hospitalization, PPE equipment and disinfection, and staff salaries.

Yet he warned that indirect costs might be even greater due to the virus' negative impact on a foal's ability to thrive. A normal foal needs to add three to four pounds a day, but if sick, this growth is stunted, and it can be difficult for a foal to catch up enough in developmental stages to be successful at racing.

Sick foals tend to be 5-12% underweight, and if weakened or compromised, many tend to develop secondary cases of other diarrhea and have the potential for joint infection or laminitis. In addition, there is indirect cost on staff at a veterinary hospital or on the farm due to exhaustion and diminished morale from treating these very sick foals.

Novel Biosecurity Practices to Prevent Disease Transmission

Rotavirus can persist in the environment up to nine months, especially on wood or porous walls. Because bedding and manure are contaminated with the virus, these materials should not be spread on pastures. Overcrowding is also known to increase risk of outbreaks.

Bailey presented a novel idea of how to manage and prevent Rotavirus infections on the farm. Claiborne Farm has robust biosecurity protocols, but despite that, foals were getting infected and no therapeutic regimen prevented occurrence of Rotavirus. So, they stopped prophylactic antibiotics and instead revamped biosecurity with a changed policy of foaling in a single barn on concrete and rubber flooring. Additional disinfection was implemented using quaternary ammonium compounds (or peroxygen compounds) sprayed twice daily on high-touch surfaces—bleach is not effective. Warm room surfaces are also cleaned and disinfected daily. Foot mats were used for each foaling stall with Virkon solution. Each stall had its own set of PPEs (boots, gloves and gowns) for stall entry.

Then, within three to four hours, or at least by 24 hours of age, the mare and foal were moved to a nursery barn. They were turned out for 10 days in a half-acre area, then grouped in 40-acre pastures after that. After the mare and foal leave the foaling barn, all foaling stalls are power washed and disinfected

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Sick foals can develop secondary cases of diarrhea and have the potential for joint infection or laminitis.

with Virkon and allowed to dry for three to 12 hours. Rotavirus can persist in the environment for up to nine days, so extra care is taken to eliminate it from the environment.

The results observed by Bailey were that after implementation of changed biosecurity protocols, only 9/96 (9%) of foals developed diarrhea. Six of these resolved within 72 hours without treatment, and only three foals needed hospital care due to sepsis (n=1), *Salmonella* (n=1) or Tyzzer's disease (n=1); the latter two illnesses were independent of Rotavirus infection.

Duffy also implemented foaling changes by foaling only outside in a small paddock. Foals weren't touched for seven days, not even to help with nursing; this seemed to break the cycle. Reducing human intervention with outside foaling leaves things up to Mother Nature. Not only did most of the foals never spend a night in a stall, but with outside living, there is less work for the help, less use of shavings and it was better for the horses. Another important point he suggested was that mares not be bred until at least March so they will foal when weather conditions are better.

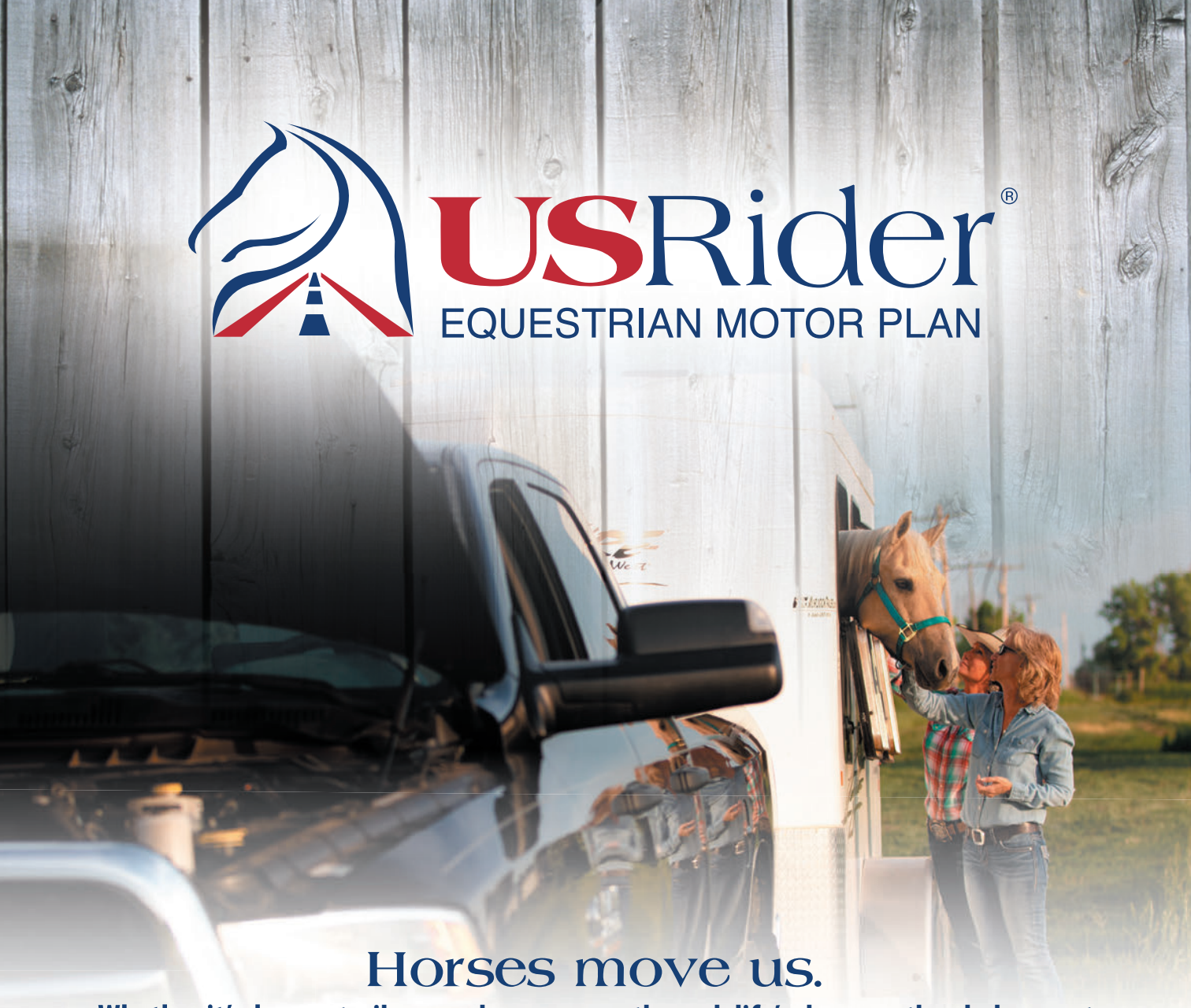
The conclusion from these changes in foaling protocol was that aggressive biosecurity management of the environment and eliminating indoor stabling for newborn foals prevent disease transmission. EM

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By Nancy S. Loving, DVM



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Prepurchase exams require excellent client communication and recordkeeping.

Research Spotlight Prepurchase Examination

A careful and consistent procedure of performing a prepurchase evaluation and excellent communication with the buyer are key to successful exams.

A prepurchase exam is a task that equine practitioners are asked to perform regularly. It requires attention to detail in order to do a thorough job, as well as a good bit of diplomacy to carefully inform a client about the findings. James Conway III, DVM, Technical Services Veterinarian for Dechra Pharmaceuticals, presented an informative webinar about important points to consider with performing prepurchase exams.

A question that comes up commonly is what to do when a veterinarian is familiar with a seller's horse but a buyer—sometimes your client and sometimes not—wishes for this veterinarian to examine the horse. Conway emphasized that a veterinarian's relationship with the seller is considered a conflict of interest for doing a prepurchase exam.

This is only acceptable if it is agreed upon by all parties. Such an agreement should be verified in writing as a means to limit the veterinarian's liability. In addition, any knowledge by the examining veterinarian of the horse's medical and surgical history should be disclosed only with permission of the seller.

Conway recommended asking preliminary questions before an exam begins:

- Is the horse in regular work?
- Is there a potential that the horse might later be up for resale? He pointed out that some conditions might be acceptable for the current use but might not be appropriate for a resale situation.
- Has the horse received any joint injections or other medications recently? Some drugs have the potential to affect results of an exam and the evaluation.

- Is the horse going to be insured? An insurance company might exclude certain conditions and might require up to 30 more days for additional information. Communication with the insurance company is important to verify what is and is not covered.
- What is the horse's intended use? Some buyers might request a less-detailed exam for a backyard horse prospect, but Conway stressed that all horses should be given the most detailed "gold standard" examination. If the buyer declines that level of examination, it is important to document that a full prepurchase exam was offered and declined.
- A veterinarian should advise the buyer that his or her role is not to assess the horse's trainability or behavior beyond the present exam period.

Questions for the seller might include how long they've owned the horse, whether the horse has been in regular work, whether the horse is on any current medications, when it was last shod, and information about and disclosure of the horse's surgical and medical history.

Another important point to bring to the buyer is the willingness of a seller to permit the attending veterinarian (and/or previous veterinarians) to release all medical records for the horse. Such records are usually released to the examining veterinarian.

A worksheet checklist for a prepurchase exam provides a document that can be scanned into a medical records file. It might be useful to use voice notes to document findings as you work.

Before the exam, the horse is identified by markings, brands and brand inspection card (where applicable). The horse's demeanor, attitude and mentation are noted. Conformation is evaluated and potential concerns noted, especially those issues that relate to form to function and might impede athletic ability and longevity. Conway likes to watch a horse get out of a trailer, walk over various surfaces such as gravel and grass, and note how the horse behaves when tied and also within a stall—this might yield evidence of certain vices such as cribbing or stall weaving.

An exam is comprehensive: The heart and lungs are auscultated pre- and post-exercise, the GI tract is auscultated with a stethoscope, the rectal temperature taken, and the abdomen scrutinized for scars. The mouth, tongue and dentition are examined, and the eyes evaluated with an ophthalmoscope and the naked eye. A hands-on examination of each leg, neck, spine and back looks for bumps, scars, effusions, sarcoids, melanomas and any abnormalities. A hoof tester exam is important, including tapping on all parts of each hoof to check for a withdrawal reaction. It is also pertinent to feel digital pulses.



ARND BRONKHORST PHOTOGRAPHY

A careful and consistent prepurchase procedure can ensure you don't miss anything.

The standing horse is evaluated for muscle mass, symmetry, swellings, joint effusion and other abnormalities. The movement evaluation is performed in all three gaits—walk, trot/jog and canter/lope. The horse is moved in straight lines and in circles to check for coordination, proprioception and soundness. Flexibility of the neck and back is evaluated. Neurologic testing is also important—cranial nerves, coordination, proprioception, balance and strength issues; use of an incline surface helps with some elements of a neurologic exam. Conway recommended using objective gait analysis software such as Equinosis' Lameness Locator to provide objective documentation of a horse's gait before and following flexion tests.

Flexion tests are an important part of a prepurchase exam. Consistency of method—how much force is applied and how long the flexion is held—helps inform the examiner. The age of the horse is taken into consideration as well as the presence or absence of lameness during the baseline exam prior to flexion testing. The horse is trotted straight out and circled with the flexed leg to the inside. It is possible to palpate many soft tissue structures while holding the limb in flexion, said Conway.

In many cases, it is appropriate to examine the horse being tacked up and ridden under saddle. Behavioral quirks might be obvious under certain conditions, while weight on the back might amplify sacroiliac or back pain or myopathies. A horse can be exercised in slow and fast work. It is also important to put the horse to the intended job; for example, a jumping prospect should be ridden over jumps, and a roping horse should be observed stopping and holding a calf. Some issues don't show up until a horse is under the specific stress of that athletic endeavor. With sufficient exercise, a horse's fitness, respiratory condition and exercise-related cardiac arrhythmias might be identified.

Laboratory testing includes drug testing of blood and/or urine for NSAIDs, sedatives, corticosteroids and any other drugs of concern. A negative Coggins

test is important for transfer of ownership as well as intra- and interstate travel. If a horse is slated for international travel, then tests for piroplasmosis, glanders, dourine and EIA are relevant. A breeding prospect might also be tested for EVA and CEM. Breed-specific concerns such as HYPP and HERDA are other appropriate tests to pursue. Conway stressed that an EPM test should not be done on a clinically normal horse as any results are not definitive for active disease, only for possible exposure.

Imaging investigates clinical findings and is best applied to concerns regarding the horse's intended use and level of work and competition. A horse that has not been in regular work or has been idle might receive additional imaging evaluation, as will a horse with a potentially quiescent but known lesion. Endoscopy of the upper airway, trachea and vocal folds is appropriate, especially for horses involved in timed events or elite sporthorse activities.

Radiographic changes should be evaluated cautiously and by taking into account the horse's history and clinical exam findings. Some auction houses and repositories have specific imaging requirements with 20-40 views common to the exam. Many buyers have particular expectations about radiographic examination, and these should be discussed and addressed. Additional imaging of more anatomic areas can be done on a horse that has potential resale value. Conway recommended offering a referral to a boarded radiologist and to document this offer, especially if the client declines to pursue this.

It helps for a practitioner to understand breed-specific and athletic-specific concerns so these can be carefully considered during a prepurchase exam. This provides the most relevant and useful information to the buyer, so he or she is able to make the best-informed decision whether to purchase the horse or not.

Take-Home Message

Conway summarized his presentation by stressing the importance of a well-documented record of all findings to include signalment, medical history, testing and results, and those procedures performed and not performed, including those offered and declined.

Informing the client of the exam findings is best accomplished by presenting factual comments and without personal bias.

These efforts help protect the practitioner from liability for mistakes or oversights.

A written record of the physical and testing findings can be sent to the buyer immediately following the exam, so that person has it for his or her records. This also ensures that no miscommunication occurred about what was heard verbally.

A careful and consistent procedure of performing a horse's prepurchase evaluation is critical. Excellent communication with the buyer is also required in order to provide a prepurchase exam that results in a satisfying experience for both the buyer and the veterinarian. EM

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