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# Inside

## 4 Publisher's Points

The New Reality

*By Kimberly S. Brown*

## 6 Keeping Up

- Cold Plasma for Wound Healing
- Foal Pneumonia Treatment Without Antibiotics
- Duration of Vaccine Immunity and Antibody Titers

*By Nancy S. Loving, DVM*

## 14 Gastric Ulcers and Stress

Since clinical signs can be absent or very subtle, it is up to veterinarians to help horse owners get ahead of this problem and treat it appropriately when it arises. *Brought to you by Boehringer Ingelheim*

*By Nancy S. Loving, DVM*

## 20 Business Briefs: Practice Software Needs

*By Amy L. Grice, VMD, MBA*

## 22 Determining Synovial Involvement of a Wound

This practical medicine topic is *brought to you by Covetrus*.

*By Nancy S. Loving, DVM*

## 23 Understanding Practice Value

Practice ownership is the key to financial success in equine practice, but a fair valuation is essential for the transaction to occur.

*By Amy L. Grice, VMD, MBA*

## 32 The Latest on Laminitis

The equine industry is still learning about what causes laminitis, how to prevent it and how to treat it.

*By Nancy S. Loving, DVM*

## 42 Communicating Boundaries

Boundaries are critical because they shape how we engage with the world, how we treat others and how others treat us.

*By Colleen Best, DVM, PhD*

## 48 Reclaiming Vaccinations

Tips for veterinarians on how to engage clients for practitioner-delivered equine vaccines. *Brought to you by Boehringer Ingelheim*

*By Nancy S. Loving, DVM*

## 57 Alternatives to 24/7/365 Veterinary Practice

There are alternatives to feeling boxed in with non-stop emergency work on top of long work days.

*By Nancy S. Loving, DVM*

## 62 Research Spotlight: Equine Herpesvirus

About 10% of EHV-1-infected horses develop equine herpesvirus myeloencephalopathy.

*By Nancy S. Loving, DVM*

## SPECIAL ADVERTISING SECTION

### 38 Is Advanced Imaging only for the 'Advanced' Case?

*By Lea Walker, DVM, on behalf of Hallmarq Veterinary Imaging*

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# The New Reality

I keep reading and hearing about the “new normal” that we are dealing with as the COVID-19 pandemic marches across the world. I think it would be better to call it the “new reality.” Why? Because we are all old enough to know what “normal” looks like, and this ain’t it!

But we also are old enough to know what reality is, and to understand that sometimes “it is what it is.”

We might not want a farm to be quarantined because of strangles, but sometimes that is the reality. We might not want that client’s top competitor to have an injury that takes him out of training, but sometimes that is the reality. We might not want to wear masks, ask clients if they have been sick, or miss that live CE that we love to attend ... but sometimes that is the reality.

The question is: What does your reality look like for you and your practice?

Your reality might mean that

- your income has suffered due to the pandemic;
- your staff has either been ill or is constantly stressed about COVID-19;
- you have been forced to reduce staff hours or lay off staff; and/or
- you are worried about bringing COVID-19 to your family due to your high-risk encounters with many clients and dealing with animals from clients that have tested positive for—or are sick from—COVID-19.

Or your reality might mean that

- you have increased your telemedicine income;
- you have better utilized your online store and pharmacy;
- you and your staff have become a more cohesive team;
- you have found other services that clients want and that you have the time to provide;

- you have learned to improve client communication without face-to-face interactions, and you have learned that clients appreciate those other communication methods;
- you have worked more closely with industry partners (i.e., pharmaceutical, nutrition, service companies) to improve your practice;
- you have taken online CE; and/or
- you have learned to earn a respectable income while balancing work with your personal life’s demands.

Most vets and practices probably have a mix of answers from the above lists—some positive, some not so positive. But where you go from here in the “new reality” will make a difference as to whether you and your practice thrive, not just survive.



## Partners Stepping Up

We would like to thank our

partners Boehringer Ingelheim and Covetrus for stepping up to sponsor articles for our readers in this issue. On page 14, you can read Dr. Nancy Loving’s article about recent research concerning “Gastric Ulcers and Stress,” which is brought to you by Boehringer Ingelheim. Then on page 48, check out “Reclaiming Vaccinations,” an in-depth article that features a review of vaccines you offer to clients and discusses the benefits of veterinarian-administered vaccines. The article also offers tips on the business of wellness, which of course includes vaccinations. In other words, you can get some great “sound bites” to use when talking to clients about this important veterinarian-provided service.

On page 22, you can read “Determining Synovial Involvement in a Wound,” brought to you by Covetrus.

We hope you stay physically and fiscally healthy, and that you successfully adapt to the new reality. **EM**



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## Cold Plasma for Wound Healing

At the International Space Station, new technology is applied for performing research. One such technology that holds promise for medical use on earth is use of cold plasma to see how this method might be applied to dealing with bacterial infections, and especially superbugs.

Cold plasma is a non-thermal, charged gas that is generated by applying an external source of energy, like an electromagnetic field, to a gas. Or cold plasma is generated current-free and indirectly between two electrodes. Other sources of cold plasma rely on a combination of both directly and indirectly generated source types.

It can permeate materials while also neutralizing bacteria, in particular methicillin-resistant *Staphylococcus aureus* (MRSA), which normally eludes strong antibiotics. It is also able

to inactivate fungi, virus and spores without damage to human or animal tissue when treatment is applied for a short exposure time of no more than two minutes. Cold plasma selectively induces apoptosis and death of tumor cells without affecting normal tissue [Gay-Mimbrera, J., et al. Clinical and Biological Principles of Cold Atmospheric Plasma Application in Skin Cancer. *Advances in Therapeutics* 2016, vol 33; pp. 894-909; DOI 10.1007/s12325-016-0338-1].

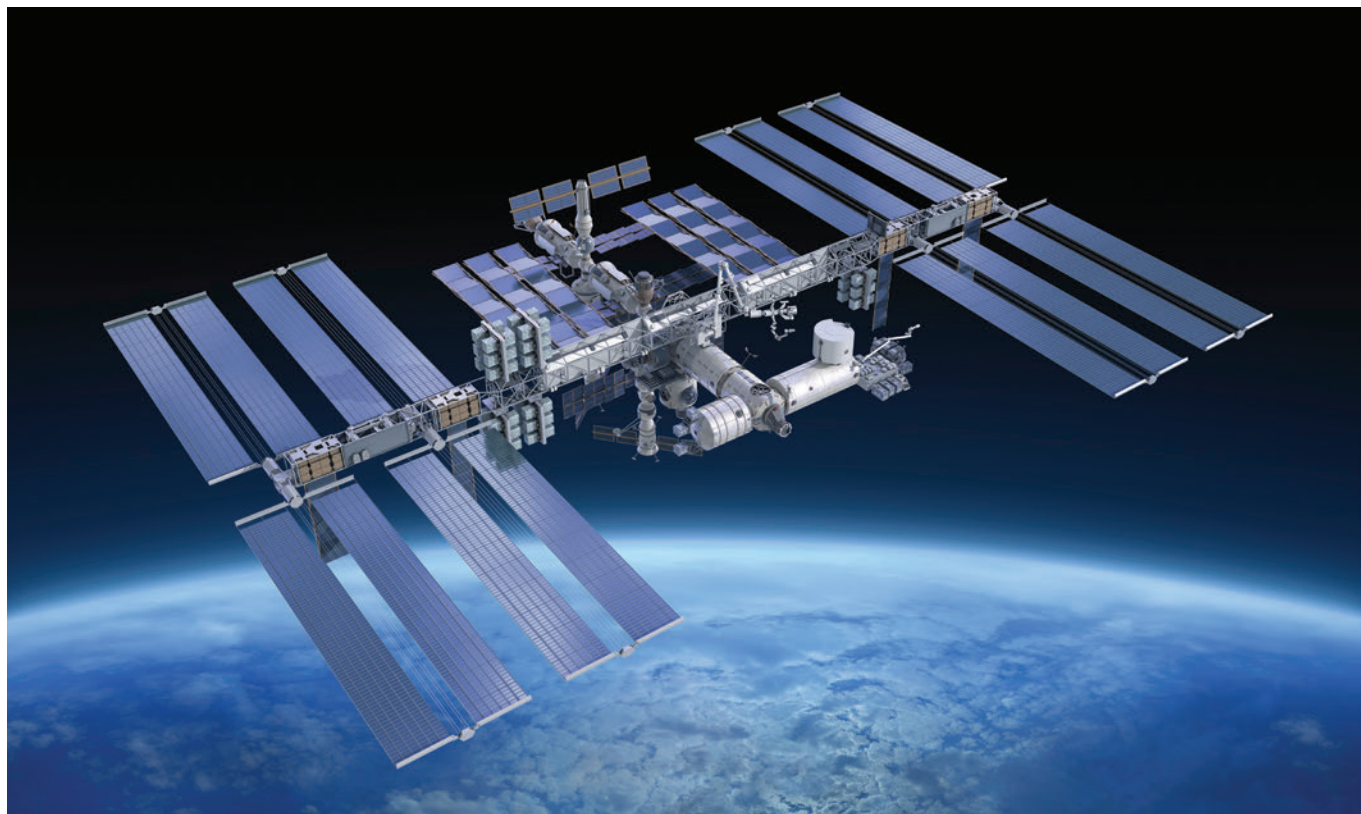
With that in mind, physicians have tried this technology on chronic wounds that have trouble healing and on skin tumors with favorable results. One company, Terraplasma Medical GmbH, has provided a device to use in hospital settings.

A report from the 2018 International Conference on Clinical and Experimental Dermatology emphasized that

“cold plasma has very high potential in dermatology, for example, in wound healing, disinfection, sterilization, the treatment of various skin infections or tissue recovery, and ultimately skin rejuvenation. Cold-Air Plasma (CAPs) allows efficient, non-contact and painless disinfection, even in microscopic openings, without damaging healthy tissues.” Ultraviolet radiation emitted by cold plasma therapy is at an order of magnitude lower than the minimum dose that elicits sunburn in human skin.

There has been recent approval by the FDA to use cold plasma in clinical trials, particularly for treating cancer cells that might remain after tumor ablation. Cummings Veterinary Medical Center is one facility that is using cold plasma for skin wounds.

It is applied with the use of a pen-like instrument, with blue light emitted in a stream directly to the target site.



**At the International Space Station, new technology is applied for performing research. One such technology that holds promise for medical use on earth is use of cold plasma.**



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The animal feels nothing other than blowing air; therefore, there is no need for sedation. The clinicians report that a treatment lasts about a minute for every square inch of area needing application, and treatments might need to be done once or twice a week until resolution.

Besides direct use of cold plasma on skin lesions and tumors, cold plasma-irradiated media or water holds promise as cancer treatment. Plasma-activated water (PAW) can be refrigerated for a week and still retain anticancer properties. This has the potential for commercial production and distribution for topical or injectable use against tumors.

### Foal Pneumonia Treatment Without Antibiotics

The Morris Animal Foundation is funding researchers at the University of Georgia and Texas A&M University to evaluate the use of GaM in foals at risk for *R. equi* pneumonia. The objective is to study use of a semi-metal compound, gallium maltolate (GaM), to treat *Rhodococcus equi* foal pneumonia. GaM is described as having antimicrobial and anti-inflammatory properties [Alvarez-Narvaez, S.; Berghaus, L.J.; et al. A Common Practice of Widespread Antimicrobial Use in Horse Production Promotes Multi-Drug Resistance. *Scientific Reports* Jan 2020, no. 10, article #911; <https://doi.org/10.1038/s41598-020-57479-9>].

The report stated concern that prophylaxis and treatment using macrolides (such as erythromycin or azithromycin) and rifampin are creating more multi-drug resistance to these antibiotics. Prophylactic use is driving increased microbial resistance, especially because many treated foals might not develop pneumonia.

Not only do macrolides and rifampin cause intestinal dysbiosis, but microbial resistance genes are shed into the environment via fecal elimination. Macrolides used to treat *Rhodococcus* pneumonia are at most 50% bioavailable, so the remainder of the drug and its metabolites are excreted in the feces. Foals can develop multi-drug resistance through contact with soil microorganisms by eating off the ground or by coprophagia of the dam's feces.

The importance of these findings suggests that “widespread use of antimicrobials for treating foals with subclinical pneumonia results in propagation of resistance to macrolides in *R. equi* and resistance in other fecal bacteria to many other antimicrobials.”

The study used GaM on foals from four Kentucky breeding farms following



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**Research showed that “widespread use of antimicrobials for treating foals with subclinical pneumonia results in propagation of resistance to macrolides in *R. equi* and resistance in other fecal bacteria to many other antimicrobials.”**

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<sup>1</sup> Data on file. Merck Animal Health.



ultrasound screening of foals with lung lesions. This evaluation identified 38 foals with subclinical pneumonia but without any clinical signs. One group of 19 received a macrolide and rifampin; the other group of 19 was administered GaM at 30 mg/kg orally once a day for two weeks. Another age-matched group of 19 healthy foals comprised a control group that were monitored but did not receive any treatment. DNA was extracted from feces taken with swabs inserted into the rectum prior to treatment and again on Day 14.

Gallium maltolate “disrupts bacterial iron metabolism and interferes with their DNA and protein synthesis.” GaM demonstrated efficacious results in treating subclinical pneumonia in foals without altering the diversity of fecal microbiota or eliciting gene resistance in bacteria within the feces. Also, reduction of resistant genes excreted

into the environment results in less persistence of macrolide-resistant *R. equi* in the soil.

## Duration of Vaccine Immunity and Antibody Titers

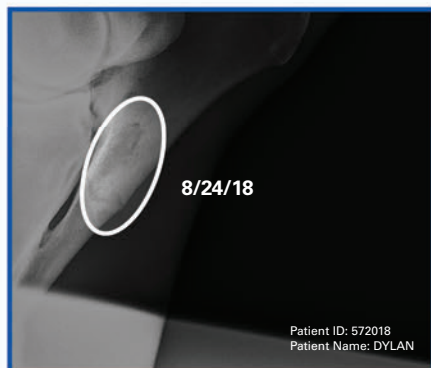
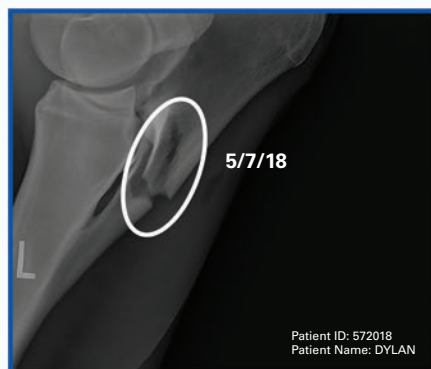
Many practitioners run into owner resistance to frequent revaccination of their horses. Owners know that many immunizations for dogs and cats are boosted only every three years, so they wonder why horses need annual or bi-annual immunizations. Owners also push back against frequent boosters because their horses might have had adverse reactions with past injections.

At the 2019 AAEP Convention, David Wilson, BVMS, MS, DACVIM, of the University of California’s veterinary school, addressed this issue.

Wilson explained that the vaccine approval process establishes the mini-

mum duration of immunity (DOI) of a vaccine given to healthy, naïve horses, but it does not address the maximum DOI. Additionally, protection is only assessed based on the primary series and not from following booster doses. Based on this protocol, most vaccines are labeled to be boosted every six or 12 months.

Regarding pushback from clients who complain about previous immunization reactions, Wilson recommended that a veterinarian assess a horse’s risk of contracting a particular disease, use a vaccine with a different adjuvant, switch to an intranasal product for influenza, and/or assess a horse’s immune status via antibody titers and revaccinate accordingly. Horses with immunosuppression, such as those with pars pituitary intermedia dysfunction (PPID), require higher levels of scrutiny as to how well they respond to vaccines.



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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). [Full Prescribing Information], Kindred Biosciences, Inc. (Burlingame, CA). Revised: 03/2019. 2. Morressey 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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**Zimeta™  
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**500mg/mL injection**

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Non-steroidal anti-inflammatory drug (NSAID)

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

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

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

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

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

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

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

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

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

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

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

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

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

dipyrone) with additional ingredients added to maintain masking during administration.

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

Adverse Reaction	Zimeta™ (dipyrone injection) (N=107)	Control Product (N=31)
Elevated Serum Sorbitol Dehydro- genase (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  $\geq 102.0^{\circ}\text{F}$ . A horse was considered a treatment success if 6 hours following a single dose of study drug administration the rectal temperature decreased  $\geq 2.0^{\circ}\text{F}$  from hour 0, or the temperature decreased to normal ( $\leq 101.0^{\circ}\text{F}$ ).

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  $20^{\circ}$  and  $25^{\circ}\text{C}$  ( $68^{\circ}$  and  $77^{\circ}\text{F}$ ); with excursions permitted between  $15^{\circ}$  and  $30^{\circ}\text{C}$  ( $59^{\circ}$  and  $86^{\circ}\text{F}$ ). Protect from light. Multi-dose vial. Use within 30 days of first puncture.

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

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## KEEPING UP (cont.)



ISTOCK

**If a horse is not vaccinated annually against rabies, then from a public health standpoint, that horse is not immunized “properly,” according to Dr. David Wilson.**

Looking at core vaccines, Wilson described what is known about protection based on serum antibody levels.

**Tetanus:** Horses receiving the two-dose primary series of tetanus toxoid after 6 months of age develop protective antibody levels for at least 12 months. As a very potent antigen, tetanus protection persists for two years up to 10 years after the third dose in a primary series is given.

**Encephalitis (EEE and WEE) and West Nile Virus:** A positive titer indicates evidence of previous infection or vaccination. A plaque reduction neutralization test (PRNT) titer  $<10$  is associated with susceptibility to infection; a horse with a titer  $>100$  is unlikely to be susceptible. (The PRNT test is available through the National Veterinary Services Laboratory in Ames, Iowa.) However, revaccination based on antibody titers is not recommended due to high rates of morbidity and mortality associated with these diseases. These core vaccines should be given annually, or even bi-annually in areas with mosquito activity year-round.

**Rabies:** It is important to immunize horses against rabies not only to protect the horse but also to decrease the risk to public health. Inactivated

rabies vaccine is a potent antigen, and horses over 6 months of age achieve an excellent serological response after a single dose. (Maternal antibodies can block a foal’s immune response until a foal is at least 6 months old.) Subsequent doses of rabies vaccine elicit a very robust and prolonged response.

That said, Wilson pointed out that a protective titer is not known in horses. Other species have rabies virus neutralizing titers  $>0.5$  IU/ml that are protective. (Serum virus neutralization tests detect the presence of antibody that neutralizes a virus in vitro.) A 2016 study (JAVMA 249, 4; pp. 411-418) of 41 previously vaccinated horses against rabies that received an additional booster all maintained antibody levels  $>0.5$  IU/ml for two to three years.

In another study, 11 previously rabies-vaccinated, non-pregnant mares developed strong anamnestic responses with sufficient titers remaining above threshold when measured 9½ to 11 years later.

Wilson advised that if a horse is not vaccinated annually against rabies, then from a public health standpoint, that horse is not immunized “properly.” If that horse is exposed to rabies, it is likely to be quarantined. **EM**





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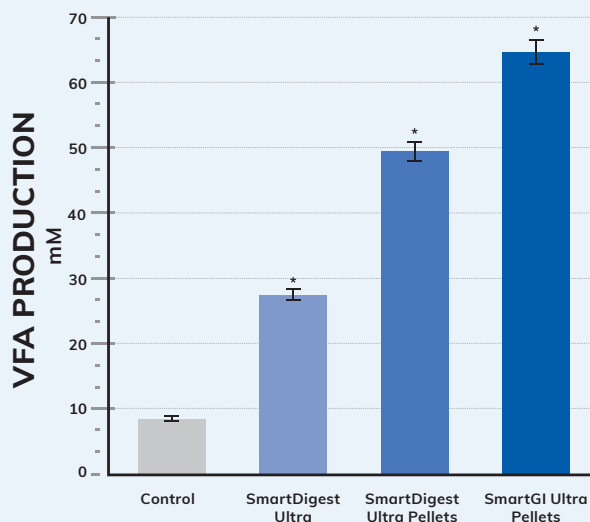
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**Training can be a stressful situation that can cause ulcers in 77% of horses, according to one study.**

# Gastric Ulcers and Stress

Since clinical signs can be absent or very subtle, it is up to veterinarians to help horse owners get ahead of this problem and treat it appropriately when it arises.

By Nancy S. Loving, DVM

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**I**t is common practice to use an oral omeprazole product (1 mg/kg daily for 28 days) in equine athletes to try to stave off development of gastric ulcers that could be related to stress conditions. Those conditions could include training, competition or transport as well as changes in routine, herd dynamics, stabling and feeding. Reports have shown that equine gastric ulcer syndrome (EGUS) develops in 63-93% of horses in active training.

One study examined prophylactic use of oral omeprazole at varying doses

and its effect on prevention of EGUS and severity of ulcers [Mason, L.V.; Moroney, J.R.; Mason, R.J. Prophylactic therapy with omeprazole for prevention of equine gastric ulcer syndrome (EGUS) in horses in active training: a meta-analysis. *Equine Veterinary Journal* (2019), vol. 51; pp. 11-19.; DOI: 10.1111/evj.12951]. This open access article can be found here <https://beva.onlinelibrary.wiley.com/doi/pdf/10.1111/evj.12951>.

The meta-analysis looked at 654 horses in training that were ages 1-11 years within seven previous studies. The

results indicate that “omeprazole prevented squamous gastric ulceration in horses in training. For those horses not given any prophylaxis, 77% developed gastric ulceration compared to 23% of the prophylactically-treated group. For horses with no previous history of ulceration, omeprazole prophylaxis reduced the relative risk of gastric ulcers by 70%. For horses with a prior history of ulceration, omeprazole prophylaxis reduced the relative risk of gastric ulcers by 87%, possibly due to a longer treatment time of 56 days related to initial treatment



time to deal with existing ulcers in addition to the prophylactic regimen.”

Omeprazole doses used ranged from 0.5 to 4 mg/kg. It was noted that there was no difference in risk ratio for ulcer prevention between 1 and 2 mg/kg dosages. (The FDA-approved label dose of Ulcergard is 1 mg/kg.)

Based on the study findings, it is thought that omeprazole prophylaxis could result in 556 per 1,000 (55.6%) fewer athletic horses developing squamous gastric ulceration.

There have been no studies on the use of prophylactic administration for longer than 28 days.

The meta-analysis report stated “It appears from the high prevalence, high efficacy and low incidence of any adverse event associated with the medication that prophylaxis should be continued for as long as a horse is in an ulcerogenic training environment.”

## Omeprazole Treatment: Oral vs. Injectable

Oral omeprazole has been the mainstay as a proton pump inhibitor for treating gastric ulcers that involve the squamous epithelium. Despite good results in many cases, 13-27% of horses do not respond to the four-week treatment protocol. Clinical response varies in individuals based on how much is degraded in the stomach, how much is bioavailable when administered at the time of feeding (particularly of feeding forage), and the variability in how well the drug is absorbed from the gastrointestinal tract.

A new formulation of a long-acting injectable omeprazole (LAIO) product has been investigated to look for improvement in response to therapy, especially for those individuals that are refractory to oral treatment. LAIO is reported to effectively suppress acid production. A study in Thoroughbred racehorses found that squamous gastric ulcers in all 22 horses healed when they were administered two once-weekly doses of long-acting omeprazole.

A recent UK retrospective study using products licensed in that country examined 12 months of case records and gastroscopy images in a different population of horses than racehorses presented to a referral veterinary hospital. The objective was to compare healing of gastric ulcers from either a long-acting injectable omeprazole product or oral omeprazole [Gough, S.; Hallowell, G., et al. A study investigating the treatment of equine squamous gastric disease with long-acting injectable or oral omeprazole. *Vet Med Sci* (2020); DOI: 10.1002/vms3.220].

The 56 horses in the study analysis were split into two groups: a) one where a long-acting injectable omeprazole (LAIO) at 4 mg/kg was given in weekly treatments to 29 horses; and b) one where oral omeprazole (ORLO) was administered to 27 horses. Healing was assessed at 14 and 28 days into the treatment regimens. If lesions weren’t healed by 14 days, those receiving injectable omeprazole received additional two weekly injections. Out of 98 injections, three horses (5.1%) developed five localized and self-resolving reactions at the gluteal injection site.

There was no difference in rate of healing of LAIO at 14 days and ORLO at 28 days. Factors other than acid suppression might have contributed to reduced healing at 14 days. By 28 days, this study’s results indicate that four weeks of long-acting injectable omeprazole achieved healing in 97% of horses compared to 67% in those receiving oral omeprazole. (Previous studies report healing of 73-87% with oral omeprazole.) Fasting horses prior to administration of oral omeprazole improves bioavailability of the drug and response to treatment.

## Transport and Gastric Ulceration

Physiologic stress responses of increased heart rate, increased serum cortisol concentrations, alterations in eating and drinking, and changes in the gastroin-

testinal microbiome are associated with equine transport. Transportation is a known stressor that increases the risk of horses developing gastric ulcers.

An Italian and Australian collaborative study evaluated 26 Standardbred, Thoroughbred and warmblood mares in their gastric responses to 12 hours of transport [Padalino, B.; Davis, G.L.; Raidal, S.L. Effects of transportation on gastric pH and ulceration in mares. *Journal of Veterinary Internal Medicine* (2020), vol. 34; pp. 922-932; DOI: 10.1111/jvim.15698].

Initially, 12 mares were confined for 12 hours overnight, and gastric fluid pH was assessed every two hours via indwelling nasogastric tubes (NGT) to evaluate the effects of 12 hours without feed on gastric pH and ulcer scores. In the second part of the experiment, conducted two weeks later, 26 mares were transported (in two groups of 13) overnight for 12 hours. The 12 horses used in the first part of the study with an overnight fast were included in the transport, with six in each of the two

**Transportation is a known equine stressor that increases the risk of gastric ulcer development.**



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**One study concluded: “There was unequivocal identification of gastric ulceration associated with transportation of fasted horses.” The researchers recommended that horses have access to feed until time of departure and possibly during transport.**

groups. Of the 26 transported mares:

- Seven mares received feed less than 60 minutes prior to transport.
- A second group of seven horses were fed six hours prior to transport.
- The original group of 12 from the initial overnight study were fasted and water withheld 12 hours before gastroscopy and NGT placement prior to departure. Gastric fluid was aspirated from indwelling nasogastric tubes every two hours.
- Endoscopic exam was performed both before and after transport to assess for gastric ulceration.

The summary of results are as follows:

- Gastric squamous ulcer scores increased with transport, especially in those horses that were fasted prior to transport.
- The 12 horses that were confined and fasted prior to transport did not develop increased ulcer scores, but that changed following transport.
- Gastric emptying was delayed after transport in horses fed before departure.
- Gastric fluid increased in its pH, possibly from alkaline small intestinal content and impaired gastric emptying. This was in contrast to low gastric fluid pH in the 12 horses confined and fasted prior to transport.
- It is possible that duodenal bile salts and short-chain fatty acids medi-

ated injury to gastric mucosa during transport.

- Horses fed either one hour or six hours before transport did not have elevated pH of gastric fluid upon post-transport exam. However, it took up to two hours to scope these individuals because the 12 horses fitted initially with NGT tubes were scoped first. That time lag might have allowed gastric function to return to normal by the time of their scoping. Additionally, it is possible that retention of feed in the stomach elicits more gastric acid secretion than occurred in fasted individuals, resulting in lower pH scores.
- Squamous ulcer scores resolved spontaneously by 60 hours post transport in 12 horses, but six needed omeprazole treatment due to increased ulcer scores relative to the start of transport.

The study concluded: “There was unequivocal identification of gastric ulceration (ESGD) associated with transportation of fasted horses.”

The researchers recommend that horses should have access to feed until the time of departure and possibly during transport to help limit contact of squamous mucosa with gastric secretions and small intestinal reflux. Based on the finding of increased gastric pH, there is some speculation that proton pump inhibitors might not be helpful prior to transportation, but they are certainly helpful following transport stress.

## Equine Glandular Gastric Disease

It has become apparent that there are two forms of gastric ulcers: squamous ulcers (ESGD) and glandular ulcers (EGGD). Their etiology seems to differ, with the most significant risk factors of EGGD being exercise frequency and stress.

A recent publication summarizes steps to diagnose and manage the EGGD syndrome [Banse, H.E., and Andrews, F.M. Equine glandular gastric disease: Prevalence, impact and management strategies. *Veterinary Medicine: Research and Reports* July 2019, vol. 10; pp. 69-76; <http://doi.org/10.2147/VMRR.S174427>].

Clinical signs of EGGD are somewhat variable: poor body condition, weight loss, poor appetite, poor performance, behavioral abnormalities and intermittent colic. Endoscopic examination to visualize the stomach lining is the most reliable diagnostic technique.

Some breeds and athletic disciplines seem to be more at risk, with the highest prevalence found in sporthorses and warmblood show jumpers. Other studies have identified increased risk of EGGD in polo horses and Thoroughbred racehorses experiencing decreases in performance output.

In general, horses asked to exercise five to seven days a week are more at risk of EGGD compared to those exer-



cising one to four days per week.

Because the glandular gastric mucosa is continually exposed to gastric acid, the inciting factors for mucosal damage are likely to be related to a breakdown of protective factors. Proton pump inhibitors are not as effective in eliciting a favorable response to treatment as is recognized with ESGD.

Disruption of the hydrophobic surface of the stomach can result in increased back diffusion of hydrochloric acid and mucosal damage. Neither NSAIDs nor *Helicobacter spp.* appears to contribute to development of EGGD.

The most prevalent risk factor for EGGD appears to be increased stress and sensitivity to stress. Cortisol might have a local effect on prostaglandin production and contribute to ulcer formation and impedance of healing. While inflammation is found in glandular mucosal lesions, more research is necessary to establish a link between intestinal inflammation and glandular ulcers.

The primary strategies for management and prevention of EGGD currently focus on reducing exercise frequency

and duration. While diet has less significance for EGGD prevention than for ESGD, there are still concerns that reduced pasture turnout, an increase in high-grain diets and the frequency of feedings might play a role.

Omeprazole has established efficacy for treatment and prevention of ESGD, but less so for EGGD. To optimize bioavailability of the drug, it is important to medicate the horse with oral omeprazole at least an hour before feeding forage.

Sucralfate provides mucosal protection by forming a physical barrier and improving the hydrophobicity of the mucus layer. It might also stimulate prostaglandin E synthesis and secretion of mucus and bicarbonate.

Combining omeprazole and sucralfate was found to help healing in 63% of horses with Grade  $\geq 2$  glandular lesions, and 83% achieved an improvement of one grade in horses with Grade  $\geq 2$  lesions. Administration of these two medications must be spaced by at least one to two hours to prevent interference in bioavailability.

Misoprostol, a synthetic prostaglandin

E analogue, might improve protective mechanisms of the glandular mucosa and reduce inflammatory cytokines; therefore, it might help with treatment of EGGD.

## Take-Home Message

Veterinarians serve as sentries to prevention of gastric ulcers in horses, and they are knowledgeable warriors to provide treatment for gastric ulcers.

Since clinical signs can be absent or very subtle, it is up to veterinarians to help horse owners get ahead of this problem and treat it appropriately when it arises. Preventing a disease is always better than treating a disease; that is an easy conversation to have with your clients.

While ulcers are common and expected in competition horses, they can be found in many other horses whose owners might not think that the horses have lives that could be conducive to ulcer formation.

Overall, recognizing and treating gastric ulcer disease is important to the overall welfare of the horse. **EM**

**The most prevalent risk factor for EGGD appears to be increased stress and sensitivity to stress. The primary strategies for management and prevention of EGGD focus on reducing exercise frequency and duration.**



ARND BRONKHORST PHOTOGRAPHY

# Business Briefs: Practice Software Needs

Veterinary practice information management requires quality software that can improve your practice's performance, patient care and client relationships. For many years, software systems with features specific to equine practice needs were not available, and practices made do with programs designed for companion animal vets.

The unique needs of equine practices—horses with multiple owners, frequent ownership changes, the prevalence of ambulatory work, large barn settings where multiple horses receive treatment on the same day, sectors like reproduction where services might be provided daily for weeks to generate a single invoice, absentee owners, etc.—create a niche market for equine-specific management software.

## Does It Work in the Field?

While all practice management systems can manage an appointment schedule, as well as create invoices and records of services and treatment, the systems vary widely in true functionality for an equine practice.

Consider the spotty cellular service in some areas of the country. An ambulatory practitioner who cannot access records on “the cloud” or seamlessly synchronize the software with the office regularly during the day might be frustrated by the inaccuracies and inefficiencies that arise.

Some equine practices still create paper records and invoices in the field that are then entered by staff members into a computer system back at the office in order to have electronic records. While

this was at one time the most functional way to manage information under certain conditions, it is quite inefficient and costly.

The best management software systems for equine practice provide for ambulatory practitioners to work when they do not have an internet connection, allowing both searching in the database and entering new data. In these cases, the laptop or tablet must then be synchronized later with the main system at the office to download data entered during the day.

Under the best conditions with modern software systems, data are synchronized automatically whenever cellular or internet service is available. Many newer model trucks offer a factory-installed wifi hotspot, making mobile management software much more functional.

## Reports and Communication

The objectives of a veterinary practice management system are to increase practice efficiency and productivity, provide better patient care and client experience, and allow easier assessment of practice growth and financial parameters.

When shopping for practice management software, look for functions such as automatic invoice generation as you create a medical record, laboratory results that can seamlessly be added to patient medical records and templates that remind you to recommend all appropriate services for certain appointment types.

There should also be drop-down menus that help you remember to charge for all services that you performed, as well as entry fields for owners and

patients that allow both registered names and “barn” names for horses, multiple owners, and agents' and trainers' names.

More satisfying client experiences will result from software that allows you to provide attractive, intuitive invoices and copies of medical records along with easily accessed medical histories and laboratory results.

Of great value are the reports that can be generated from the data collected within the management system. You want production reports that can be sorted by doctor, type of service (e.g. laboratory, dentistry) and specific service or product.

The system should track your accounts receivable with aging, as well as manage your inventory.

## Before You Buy

No matter how carefully you research available software packages, sometimes your expectations are not met. In order to avoid this outcome, talk to other practices using the system you are considering, finding out as much about their experience as you can.

Once you decide on a practice management software package, expect the transition to the new system to be onerous. Sometimes there is difficulty in bringing in data from your old system without corruption. Rarely, the new software has “bugs” that must be addressed.

The hardest part is simply learning something new while working in a busy practice with all of the normal demands. In a few weeks or months, if you have chosen well, you will be happy you made the change. **EM**



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# Determining Synovial Involvement of a Wound

By Nancy S. Loving, DVM

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**W**ounds over a synovial structure require special evaluation. Some wounds might be obviously leaking synovial fluid whereas others are in proximity to a joint, bursa or tendon sheath without an obvious way to determine whether the synovial structure has been penetrated or contaminated. At the 2019 AAEP Convention, Jacqueline Hill, DVM, DACVS-LA, of Littleton Equine Medical Center, presented practical information on how

to determine synovial structure involvement of a wound in the field.

Ultrasound, especially with a linear 7.5 MHz probe covered with a sterile sleeve, is used to view a clipped and cleaned wound. She said to make sure to ultrasound the wound before a probe has been inserted as that might introduce air artifacts. Gas or fluid lines visualized on ultrasound delineate a puncture tract that could have entered a synovial structure. Imaging signs that might indicate synovial penetrance: increased synovial fluid, gas echoes, thickened synovial

membrane, fibrin and/or an irregular bone surface.

A radiographic examination is best focused on surrounding soft tissue structures rather than bone. Gas opacities within a synovial structure tend to collect in more proximal recesses. Radiographs can be taken with a probe in place to demonstrate depth and location of a wound tract.

Synoviocentesis using aseptic technique obtains synovial fluid for analysis. The needle is best inserted in a site that is not directly over or within the wound or involved with cellulitis. The fluid is put into an EDTA-blood collection tube, and cytology is examined in the lab. Gram staining a slide of the fluid helps identify bacteria to check for sepsis.

Contrast radiography can help outline a wound tract—this procedure is done after a synovial fluid sample has been taken. Saline can first be injected to distend the wound. If saline leaks out without the structure accepting pressurization, it is likely that the synovial structure has been breached. Contrast material is used to perform an arthrogram, with the needle left in place but capped to prevent leakage of the dye while obtaining images. Some prefer to inject contrast material directly into the wound then radiograph; however, there is a risk of forcing contamination into deeper tissues and the dye does not always follow the exact wound path.

The use of blood SAA is most valuable for an older synovial wound, but that must be interpreted with caution, as soft tissue inflammation or cellulitis cause this parameter to elevate due to inflammation. **EM**

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# Understanding Practice Value

Practice ownership is the key to financial success in equine practice, but a fair valuation is essential for the transaction to occur.

By Amy L. Grice, VMD, MBA

**W**hether you are interested in buying or selling shares in a group practice, buying an entire practice outright, merging with a colleague, or are considering transitioning out of practice ownership altogether, determining the fair value of the practice is the foundation of a successful transaction. There can be important tax considerations for both buyers and sellers with ownership transfers, as well as essential elements of partners' operating agreements to consider. Consulting with accounting and legal professionals about these matters is recommended.

## Types of Ownership Transition

Practice sales can be in entirety (100%) to a group or individual, or the practice can sell a percentage of the shares to bring in a partner. Sometimes neighboring practices decide to merge to increase economies of scale, share resources, and minimize on-call duties. Large hospital practices sometimes acquire small or solo practices in their regions to ensure referral streams.

Mergers require careful attention to details such as which practice's software and price list will be used, whether the practice will have a new name, and how the shares of the new company will be allocated.

Generally, both practices are valued by the same professional, using identical assumptions to make appropriate adjustments to the financial statements. Then the shares in the new company are apportioned to the new owners accordingly.

For instance, if Practice A with two equal owners is valued at \$500,000 and Practice B with three equal owners is valued at \$1,000,000, the merged practice value of \$1,500,000 will be apportioned as follows: Owner A1 16.66%, Owner A2 16.66%, Owner B1 22.22%, Owner B2 22.22%, and Owner B3 22.22%.

If the new entity wished to have five equal partners, Owners B1, B2 and B3

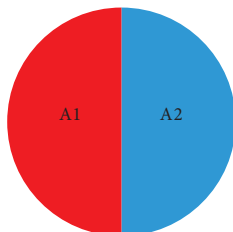


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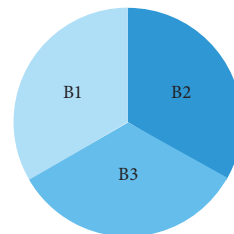
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would each sell 2.22% of their shares, with Owners A1 and A2 each purchasing 3.33%. (See diagram above.)

Acquisitions allow larger practices to increase their reach through satellite practices. This is a strategy often undertaken by hospital practices to ensure a good referral base. An ambitious practice of any size could also work to consolidate a group of nearby solo practices as their owners near retirement in order to insure practice growth. This orderly transfer often appeals to retiring veterinarians who are concerned about ongoing good care for their clients and patients.

A1 \$250,000 Equity  
A2 \$250,000 Equity  
B1 \$333,333 Equity  
B2 \$333,333 Equity  
B3 \$333,333 Equity  
Total Value = \$1,500,000



Other acquisition patterns in the marketplace now include corporate buyouts such as those initiated by MAVANA, NVA and Avanti (see *EquiManagement* Summer 2020 issue).

## Valuation

In performing a valuation, it is necessary to adjust the practice's financial statements in order to determine the practice's true profitability. This is because financial statements can vary widely depending on practice management and tax accounting policies. As a result, they rarely reflect true economic reality.

The goal of such adjustments is to restate the financial statements so that they reflect the fair market perspective of the revenues and expenses on an ongoing, operational basis.

How owners are compensated is often the most important adjustment. The value of a practice primarily rests on the profit that the practice produces. Because profit drives practice value, it is necessary to separate owner(s)' compensation for their effort as veterinarians from their compensation for taking on the work and risk of ownership.

When determining value, financial reports are corrected to reflect owners being paid for their efforts as veterinarians as though they were associates—in other words, by the same formula. This accounts for what the practice would be required to spend to replace the owner(s) if they were injured or otherwise unable to work in the practice.

However, because some practice owners might receive different benefits (e.g., family health insurance versus single, or expenses for a personal horse's medical care) the compensation



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formula (% of revenue production) might vary between partners in order to provide equitable compensation.

If owners' compensation for their work as veterinarians is not accounted for, excessive profit will be shown on the financial statements and will not accurately reflect the practice performance.

An owner's share of profits is the return on that individual's investment in the practice. If a partner owns 10% of the shares, typically he or she would be entitled to 10% of the profits. However, sometimes a particular partner (the "rockstar") might produce vastly more revenue than another, which would provide more profit to the pool. Or one owner might be nearing retirement and only working part-time, while his or her partners work significantly more hours.

The partnership's or corporation's operating agreement will specify how profits are distributed—by ownership

percentage or by revenue production percentage.

Buyers should thoroughly understand how compensation for shareholders is managed before making the purchase.

While owner compensation might not seem important for sole proprietors, when it comes time to sell shares to an associate or outside party, having clean financial reports that clearly show profit after appropriate compensation for the owner(s)' professional work is important. This allows accurate profit—the basis of value—to be portrayed.

Compensation for management duties flows to owners according to the percentage of the tasks they undertake. Generally, 1-3% of practice gross revenue is set aside for management compensation. If one partner does 100% of the management, the entirety of this money would flow to him/her. Salary and benefits for a practice manager should also be allocated from these funds.

Therefore, a small practice with \$1 million in gross revenue has a maximum of only \$30,000 for management compensation. This is an indication that hiring a full-time practice manager would be premature. An allocation for management is another typical adjustment made by the valuator, if this is not already in place.

When a practice owns a facility, the real estate is generally held in a separate entity for liability protection. Owners of the real estate entity receive compensation for their return on investment in real estate. The real estate corporation pays the mortgage and leases the facility to the veterinary firm. Any net proceeds from lease payments are distributed to the real estate owners after all expenses are paid.

Real estate income is particularly sought after because Social Security and Medicare taxes are not collected on these monies, so often lease payments



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**The Market Approach to practice valuation determines the value of a business by comparing it to similar businesses that have been sold in the open market.**



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can be maximized to increase this tax savings.

Thus, another adjustment that is frequently made when determining value is to the amount of a lease. Typically, the annual lease should not exceed 10-11% of the appraised value of the property or 4-6% of the practice's gross revenue production.

After this adjustment, there are three approaches to valuing businesses, with one used most frequently for evaluating veterinary practices. The three methods are the Market Approach, the Asset Approach and the Income Approach.

The **Market Approach** determines the value of a business by comparing it to similar businesses that have been sold in the open market. The comparable businesses must be substantially similar, but not necessarily identical, to the business being valued. The challenge, of course, is finding data about veterinary practices that are substantially similar and have sold recently.

Since most practices are privately owned, data about their sales is not generally public knowledge. Consequently, the Market Approach is seldom used in valuing veterinary practices.

The **Asset Approach** derives the value

of a practice based on the current value of each asset it owns. Beyond tangible assets (trucks, medical equipment, inventory, etc.), a very significant component of the value of a veterinary practice lies in the intangible asset often referred to as goodwill.

In considering the value of goodwill, a subjective decision must be made by the valuator, because there is an important difference between personal (professional) goodwill versus practice (enterprise) goodwill.

The practice goodwill value is determined by the net income that the practice generates. The value of the practice goodwill is not found in the practice attributes of reputation, client list or geographic area in which the practice operates. Though these things might contribute to profitability, practice goodwill is only quantifiable as the profit that the practice generates.

On average, 70-80% of the practice value will be associated with practice goodwill. The practice goodwill value will be proportionate to the earnings of the practice after fair compensation for professional and managerial efforts.

Profitability of a practice not only affects the return on investment dis-

tributed to the owners over the years of operation, but also has a large effect on the sale price of the practice at retirement.

One of the risk factors when purchasing a practice is the seller's ability to effectively transfer professional goodwill. How difficult that transfer is depends on whether the professional goodwill belongs to the individual owner, to the practice or to some combination of both.

In a one-doctor practice where the owner knows all the clients and treats all the patients, the reputation of the practice is highly related

to the doctor. Therefore, if you were to buy that practice, it would be critical that the owner transfer his/her personal goodwill by introducing you to the clients, speaking highly of your qualities as a veterinarian and as a manager, and working to convince the clients that they will continue to be in good hands.

By contrast, in a multi-owner and multi-doctor practice, where clients might routinely see various doctors based on available slots on the appointment calendar, they will likely be bonded more to the practice than to an individual doctor. Clients in this instance understand that all of the doctors practice quality medicine and are all representatives of the practice's brand identity. If one doctor or owner leaves, the odds are good that clients will continue to utilize the practice's services.

This is an example of practice goodwill, which is easier to transfer to a new owner and less risky for a prospective owner to purchase.

However, sometimes one of the owners is a very high producer of revenue and has a star-quality reputation, making it likely that revenues will fall when that veterinarian leaves, unless he or she has transferred significant case load



in the year or two before departure. When determining future revenues and profits, the “rockstar” factor must be considered by the valuator.

The tangible assets are priced at fair market value. Fair market value can roughly be considered the replacement cost of the subject asset multiplied by its remaining useful life. As an example, a 3-year-old ultrasound machine with a life expectancy of six years and replacement cost of \$20,000 would have a value of \$10,000  $(((6-3)/6) \times \$20,000)$ . A professional appraiser is used to establish the value of tangible assets.

The **Income Approach** is the most common means of appraising a professional service business such as a veterinary practice. This method bases value solely on the ability of the practice to generate income (profit).

Fundamentally, this approach has the greatest appeal in that value is based on anticipated future returns. This approach pays no regard to the value of individual assets, because both the tangible and intangible assets are collectively responsible for generating the income upon which the value is based.

The Income Approach views the practice as an investment: The income the practice is forecasted to produce is the return the practice owner receives for making the investment.

There are three types of Income Approaches: Capitalization of Earnings/Cash Flow Method, Discounted Earnings/Cash Flow Method and the Excess Earnings Method.

Logically, the greater the return, the more valuable the practice is. Unfortunately, many practices provide owners with a good job and a comfortable living, but they generate little earnings (profit) beyond the owner's salary. Inasmuch as these practices do not produce a fair and expected return on investment, they are of little value.

The value of a business is not based on what it owns as physical assets, but rather what it earns in profit using

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those assets. In other words, when you sell your practice, you will really be paid for the company's ability to make money. If you have limited or no profit, all you have is used equipment to sell.

The Income Approach focuses on the income statement (P&L). It is founded on the theory that a business should yield a fair return on the owner's capital invested in the business. For valuation purposes, both "earnings" and "fair return" need to be defined.

For tax reasons, business owners of "S" corporations often want to minimize their salaries in order to maximize their profit distributions, which pass through to them as individual investment income and are not subject to Social Security and Medicare taxes.

In other types of corporate entities, owners might want to maximize salaries in order to minimize taxable profits. In addition, owners usually want to credit the company with as many discretionary (personal) expenses as possible. Strategies such as these will help hold down the company's taxable income; therefore, "earnings" must be restated to reflect the actual return on investment to the owner, in order to determine the accurate value.

For closely held businesses, "earnings" are commonly defined as a combination of:

1. the accounting net profit +/-
2. excess or shortfall in owner's salary—the amount an owner is paid above or below the amount a hired veterinarian would be paid for the same job +
3. depreciation/amortization expense (non-cash expense items) +
4. discretionary expense items (personal expenses) +/-
5. extraordinary one-time expenses or income

The value of the company is based on what it will earn in the future, not on what it produced in the past. But the past provides the basic data on which to base future projections.

Past earnings can be used in three different forms to calculate value. The basis

for selection would be which form most accurately reflects the earnings which the company is expected to produce in the future:

- average earnings (for three to five years)
- weighted average earnings (for three to five years)
- current (or most recent) earnings.

The earnings available to the owner of a business represent a return on the funds that have been invested in the business—in simplest terms, the initial capital stock plus retained earnings (cash that could have been distributed but was left in the company).



ARND BRONKHORST PHOTOGRAPHY

### **The Income Approach to practice valuation focuses on the income statement (P&L).**

As an example, if a buyer were to invest \$100,000 in a practice and wanted a 20% return on his/her investment, the business would need to produce \$20,000 per year ( $\$100,000 \times 20\% = \$20,000$ ) in earnings (profit).

Taking the opposite approach, if a business produced \$20,000 in earnings per year and a prospective buyer required a 20% return on investment, he or she would, in theory, be willing to invest \$100,000 in the business.

Stated another way, the value of a business that produces \$20,000 in earnings per year is worth \$100,000 for a buyer that requires a 20% return

on investment. In this example, the "20%" is the "capitalization rate," and it is equivalent to the required return on investment on earnings. Capitalization rates can be used to determine the value of a business, based on earnings.

The higher the risk in an investment, the higher the required return will be. A buyer would require a higher rate of return on investment from a business that was perceived to be higher in risk. The capitalization rates for "risky" businesses are, therefore, higher than those for less risky companies.

The commonly used capitalization rates for veterinary practices are 20-40%. The capitalization rate is the inverse of a multiple of earnings: A "cap rate" of 20% equals a "multiple" of 5.

Using the previous example: Earnings \$20,000 x multiple of 5 = value \$100,000.

If this practice were at higher risk, the capitalization rate could be 40%, or a multiple of 2.5. In this case, the practice would be worth  $\$20,000 \times \text{multiple } 2.5 = \text{value } \$50,000$ .

In other words, the key for value is how much profit and how much risk.

Determining the appropriate capitalization rate for a given practice is one of the most significant responsibilities of the valuation professional since small variations in the capitalization rate can change the determined practice value significantly.

Risk factors that a buyer should consider in purchasing a practice include consistency of past revenue growth, expected future earnings, transferability of goodwill, location, quality of staff and facility, demand for services, regional demographics, effective practice management, competitive environment, practice stability and lease terms.

A capitalization rate multiple of 5 generally reflects a well-managed practice with multiple doctors, all of whom "ride for the brand" and will continue producing the same amount of revenue after the sale.

This profitable practice would also





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<sup>1</sup>Townsend L. Horse flies and deer flies. University of Kentucky ENTFACT-511.  
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have excellent risk mitigation by having written policies and procedures, compliance with OSHA, DOL and DEA regulations, and dedicated, long-term staff members. Minimizing risk increases the capitalization rate multiple.

(Note: You can calculate your practice's valuation using the diagram below.)

The **Discounted Cash Flow Model** is similar to the earnings method described above. This method has become one of the standards in valuing equine practices over the last decade.

In essence, your practice is worth exactly the amount of excess money it can generate for the new owner or

shareholder into infinity, discounted to today's present value.

This can be calculated via a formula and is then further discounted (35-65%) for transferability (ease in sale compared to publicly traded stock). When a practice is valued fairly, buyers should be able to service the debt, interest and tax (on the flow of cash that they receive for being an owner) with their share of the profit (cash flow) when the sale is financed over 10 years at the prevailing interest rate. To get a quick semi-accurate estimate of your practice's value, you can use a calculator at [www.calcxml.com/calculators/business-valuation](http://www.calcxml.com/calculators/business-valuation).

Purchasing an existing practice is generally a safer investment than establishing a new practice. This is because the existing practice has an established clientele and a history of financial performance and resulting cash flows (profit).

However, a fair valuation of the practice being purchased is of paramount importance to the purchaser. Regardless of the valuation approach or methodologies used to derive a value, the purchaser must develop projected financial statements to ensure that there is sufficient cash flow to meet the financial obligations of the practice after purchase.

When fairly valued, a practice should have sufficient cash flow to allow the new owner to retire the debt obligation associated with the purchase over 10 years after being fairly compensated as a veterinarian and business manager.

Through the initial decade of practice or share ownership, regardless of whether it is a startup or a purchased practice, significant equity will accumulate, but little money will likely be available to be extracted for personal use unless the practice and profit are growing. However, after the debt associated with the practice purchase is satisfied, ownership allows the practice owner to reap higher income than that a veterinarian could earn as an associate because of distribution of profit.

In addition, at retirement, the equity that has accumulated can be harvested when the owner sells the practice or his/her shares in the practice.

## Take-Home Message

Practice ownership is the key to financial success in equine practice, but a fair valuation is essential for the transaction to occur.

Sellers need to allow three to five years of ownership before sale of their practice or shares in order to utilize efficiencies to increase profit and value, and potentially to correct business practices that obscure true profit. **EM**

<b>Business Valuation Worksheet</b> CAPITALIZATION OF EARNINGS		Least Recent Year = C	Next Recent Year = B	Most Recent Year = A
Step 1: Restate Earnings for the year				
	Net Profit			
	+/- "Excess" or "Shortfall" in Owner's Salary			
	+ Owner's Discretionary Expenses			
	+ Depreciation Adjustment			
	+/- One-time Unusual Expenses or Income			
<b>TOTAL</b>				

Step 2: Calculate Current and Average Earnings		
	Current Earnings = A	
	Average Earnings = (A + B + C)/3	
	Weighted Average Earnings = (3A + 2B + C)/6	
Step 3: Select Capitalization Rate		
Step 4: Divide Earnings by Capitalization Rate		
	Current Earnings / Cap Rate =	
	Average Earnings / Cap Rate =	
	Weighted Average Earnings / Cap Rate =	



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

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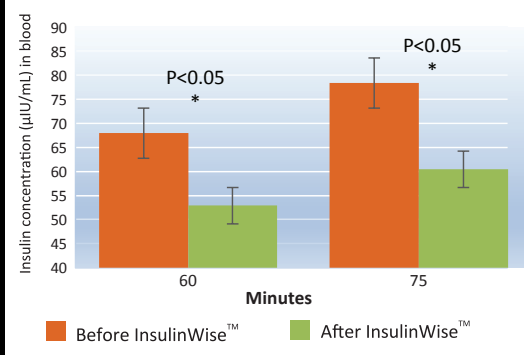


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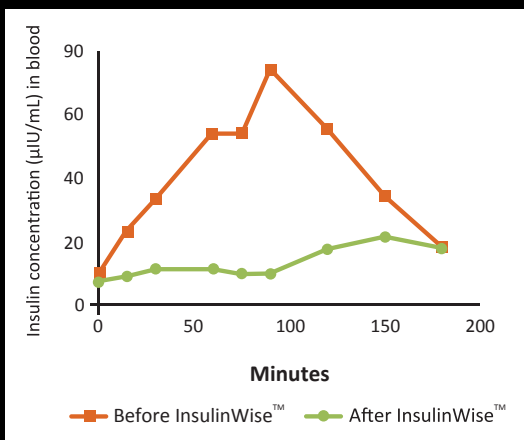
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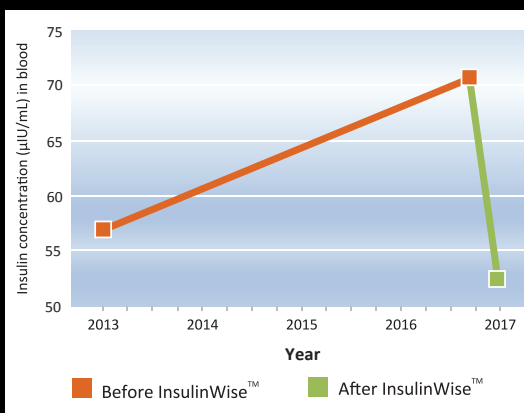
### InsulinWise Supported a Decrease in Insulin Resistance

*In four of the horses previously identified as insulin resistant, insulin regulation reverted to levels classified as normal after supplementation with InsulinWise.*



### Insulin Levels at 60 Minutes During Oral Sugar Tests from 2013 to 2017

*Over time, EMS horses became more insulin resistant. Supplementation with InsulinWise significantly reduced insulin levels in the blood, signifying a decrease in insulin resistance.*





**Endocrinopathic laminitis is linked to obesity, insulin dysregulation, pasture-associated laminitis, EMS, PPID and/or administration of glucocorticoids.**

# The Latest on Laminitis

The equine industry is still learning about what causes laminitis, how to prevent it and how to treat it.

By Nancy S. Loving, DVM

**L**aminitis research continues to progress as clinicians pursue efforts to prevent and manage this insidious and painful syndrome. Recently, a new paradigm for looking at laminitis was presented by Cathy McGowan, BVSc, MACVSc, DEIM, Dip ECEIM, PhD, FHEA, FRCVS, of the Equine Sciences Department at the University at Liverpool. Her pioneering research into endocrinopathic laminitis has yielded invaluable information that elucidates a different pathologic process than previously considered.

Historically, it has been thought that laminitis pathophysiology falls into one “bucket” of pathological changes primarily related to ischemia. This is no longer the case. In fact, now it is considered that

there are three distinct pathways to the development of laminitis:

1. endocrinopathic laminitis (EL)
2. sepsis-associated laminitis (SAL)
3. support limb laminitis (SLL)

A presentation at the 2019 Northeast Association of Equine Practitioner’s Symposium by Andrew van Eps, BVSc, PhD, DACVIM, of University of Pennsylvania’s School of Veterinary Medicine, outlined distinct differences and similarities between these forms of laminitis.

All three forms result from injury to, and ultimate failure of, lamellar epithelial cells that result in either lamellar epithelial stretching and/or failure of epithelial cell adhesions between cells and their dermal connections with the basement membrane. While all these cellular disruptions can occur in any case of

laminitis, each of the three pathways has a predominant pathological footprint.

Endocrinopathic laminitis develops mostly due to cellular stretch from disruption of the cytoskeleton. Sepsis-associated laminitis and support limb laminitis result primarily from loss of cell adhesion of the hemidesmosome and desmosomes.

Research (pursued at the Belknap laboratory at The Ohio State University’s veterinary medicine department) has identified a problem at the level of the mTOR signaling pathway that is important to cell growth and homeostasis, as it regulates epithelial-mesenchymal transition (EMT). Regardless of the inciting cause of laminitis, alterations in mTOR signaling and resultant changes in EMT integrity occur in all three forms of lam-



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initis. Structural failure of the lamellar cytoskeleton and interference with cellular energy metabolism are consequences of abnormal mTOR signaling. Similar aberrations in the MTOR signaling system also play an important role in the pathophysiology of cancer and diabetes.

## Endocrinopathic Laminitis

Endocrinopathic laminitis is linked to obesity, insulin dysregulation, pasture-associated laminitis, equine metabolic syndrome, pars pituitary-intermedia dysfunction (PPID) and/or administration of glucocorticoids. Roughly 90% of laminitis cases are due to these types of metabolic derangements.

While laminitis from sepsis is associated with acute lamellar inflammation and adhesion failure, that is not the case with endocrinopathic laminitis that occurs more slowly—some horses demonstrate hoof wall ridging or changes in the sole and white line months



KIMBERLY S. BROWN

**Cooling of hooves with cryotherapy is important early after recognition of laminitis and to alter progression of the disease.**

before a full-blown laminitic attack. The delay in development of overt laminitis signs might be due to intermittent and transient hyperinsulinemia based on endocrine triggers, as well as ingestion of diets that include soluble carbohydrates such as grains or rich pasture.

Hyperinsulinemia is an inciting cause of lamellar stretch. Excessive insulin overstimulates growth factor receptor IGF-1R that then triggers a proliferative response in lamellar epidermal cells. The result is disruption of normal cell adhesions. (Excess activity of this growth factor, mediated by mTOR, also alters EMT in epithelial cancers.)

## Sepsis-Associated Laminitis (SAL)

Roughly 12% of laminitis cases result from systemic inflammation, particularly when bacteria and endotoxemia are involved as occurs with metritis, pneumonia, colitis and enteritis. Endotoxin is considered an important risk factor and trigger in these cases.

Sepsis can result in dysfunction in multiple organs, with laminitis one form of organ dysfunction.

Features of human cases—circulatory derangements, local inflammation, apoptosis and non-ischemic derangement of cellular energy metabolism—have been investigated in the horse.

Local inflammation involves cytokines and leukotriene (IL-6) activation that are often implicated in systemic inflammation. Matrix metalloproteinases that degrade the extracellular matrix have a secondary role in disrupting lamellar integrity. It is also possible that dysregulation or failure of oxidative energy metabolism in SAL can elicit adhesion failure in lamellar epithelial cells.

## Supporting Limb Laminitis (SLL)

Supporting limb laminitis is a risk factor in a horse that is non-weight-bearing on one limb due to an extremely painful orthopedic injury or fracture repair. Supporting limb laminitis is estimated



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ed to occur in 10-15% of horses with significant orthopedic conditions. One suggested mechanism for why laminitis occurs in the contralateral limb from the injury is explained as an increase in load created by a horse standing full time on a single front or rear limb; lamellar epidermal remodeling might occur in response to this mechanical stress.

In addition, a horse's constant stance of full weight on the supporting limb obviates the normal cyclic limb loading that is critical for normal blood circulation and energy provision to the lamellae.

Normally, nutrients and oxygen are delivered to the lamellar dermis through the blood during cyclic loading as a horse weights and unweights a limb by shifting weight at rest or by walking. Without this cyclic loading, lamellar tissues might be deprived of glucose that is important energy to maintain the lamellar cytoskeleton and epithelial adhesions. Ischemia can further contribute to supporting limb laminitis, but it does not seem to play a role in the other two forms of laminitis.

## Treatment Approaches to Laminitis

The more quickly a horse is recognized at risk of laminitis or in the throes of the disease, the better the possibility of arresting progression of lamellar injury. As much as possible, prevention is key. If that didn't occur, then early intervention is important to control inflammation and to limit further mechanical damage. In all active cases of laminitis, movement restriction is important through stall confinement supplied with comfortable bedding.

For horses with sepsis-associated laminitis, the goal is to reverse and control the primary disease problem, whether it be gastrointestinal disease, metritis, pneumonia or grain overload.

Strategies include intravenous circulatory support, binding of endotoxin with polymyxin B and hyperimmune plasma, inflammation control with NSAIDs and attention to cooling of the hooves with cryotherapy.

The feet should be cooled to temperatures below 50 degrees Fahrenheit using ice baths or boots, if possible. Cooling is best accomplished by immersing the limbs from the mid-cannon to the bottom of the hooves in an ice bath or cooling boot. Sole support is critical when the feet aren't being iced—appropriate hoof trimming, special orthotic support (Soft-Ride boots, as one example) or the

portions less quickly and more closely resembles "grazing." Exercise programs are important not only to whittle away overweight pounds but also because exercise improves insulin sensitivity.

Cryotherapy is also recommended for active cases of endocrinopathic laminitis to alter progression of an acute laminitis flare.

Cases that are refractory to strict dietary control measures might need further help to reduce body weight by using medications like metformin and thyroid supplementation. Horses with PPID respond well to daily treatment with pergolide.

Investigation is ongoing on the use of veglagliflozen to counteract insulin dysfunction by reducing reabsorption of glucose by the kidneys and increasing excretion of glucose through the urinary tract.

Prevention or control of supporting limb laminitis relies on enabling a horse to comfortably weight the injured limb enough that the support limb receives a necessary amount of cyclic loading from shifting of weight and

walking steps.

In some cases, the use of sling support might help to relieve the mechanical stress on the lamellae of the supporting limb.

Appropriate analgesia improves comfort and facilitates reasonable use of an injured limb to better normalize limb weight distribution.

## Take-Home Message

The veterinary industry is still learning about what causes laminitis, how to prevent it and how to treat it.

Ongoing research should help practitioners and horse owners learn more about the various causes of laminitis and hopefully offer prevention and treatments that can help bring horses back to full function. **EM**



ARNOLD BRONKHORST PHOTOGRAPHY

**Supporting limb laminitis is estimated to occur in 10-15% of horses with significant orthopedic conditions.**

use of deep sand are greatly helpful to support internal hoof structures as well as for improving a horse's comfort.

Endocrinopathic laminitis is best managed with early intervention to control obesity and body condition through dietary strategies and exercise, preferably before a horse becomes lame.

Screening tests of insulin and ACTH can help to identify horses with insulin dysregulation and/or PPID.

Pasture should be eliminated while also controlling the amount and type of food offered by limiting concentration of non-structural carbohydrates to less than 10%. Soaking hay and pouring off the supernatant removes as much sugar as possible before feeding.

The use of slow feeders or nibble nets allows a horse to consume its dietary



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# Is Advanced Imaging only for THE 'ADVANCED' CASE?

By Lea Walker, DVM  
on behalf of Hallmark Veterinary Imaging

Lameness is non-discriminatory. It affects all breeds, all disciplines, all ages and all genders of horses. Therefore, lameness in our equine patients affects all equine veterinarians to some degree.

Whether you are a rural ambulatory practitioner or the senior clinician at a referral hospital, the client is depending on you for answers when his or her horse develops a lameness. You start to work up the case by gathering the horse's history, perform a physical examination and gait analysis, perform blocks where necessary and localize the problem area to the smallest region possible. You pull out your radiograph equipment or your ultrasound

and take a full set of images, with at least a part of you hoping the answer shows up in "black and white," so you can make a recommendation for treatment. Things get complicated when the answers aren't there, and you're left with no obvious reason for your patient's lameness.

Whether you have been in equine practice for 10 months or decades, it is probably safe to say that we have all been in this position at one time or another. We have no answer other than: "The horse is lame ... this is where it's lame ... and there are no obvious radiographic or ultrasonographic abnormalities." Now what? You're frustrated because you don't want to "guess," but where do you start when considering refer-

ral for advanced imaging? Several thoughts come to mind: Is more imaging going to change my recommendation for treatment? Will I lose the patient and client to the referral clinic? Isn't this going to be extremely expensive?

"Advanced diagnostic imaging" has revolutionized our ability to provide an accurate diagnosis and improve prognosis in equine lameness. Advanced diagnostic imaging can be a slightly nebulous term, but generally refers to cross-sectional computed tomography (CT) and magnetic resonance (MR) imaging, and to a lesser extent, fluoroscopy. Modalities such as MRI and CT should no longer be viewed as advanced imaging for the "advanced" case, horse or

client. In contrast to human sports medicine, where the use of these modalities is ubiquitous and they are generally accepted as "standard of care," their use is not as frequent in equine sports medicine. However, MRI and CT are quickly becoming more accessible because they are available in more locations, more affordable as the demand for these services increases, and in many cases, the patient returns to the primary care veterinarian for treatment after imaging is performed.

**Magnetic resonance imaging (MRI)** gives us the ability to assess structures within the limb—perhaps most importantly, within the foot. MRI can be used to look at the anatomy from multi-





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**MRI gives us the ability to assess structures within the limb.**

ple angles, giving the best chance of finding even the smallest of problems. MRI is unparalleled in providing detailed images of both soft and bony tissues. Distinguishing water from fat, it highlights areas of pathology such as inflammation and bruising. By imaging the region of interest in slices orientated in any 3D plane, a lesion can be visualized without superimposition of adjacent structures. Multiple views allow you to appreciate the full extent of the injury. For example, tearing of the deep digital flexor tendon occurring in a section of tendon within the foot can be identified, even if the tear is only a few millimeters in size. Standing MRI has the clear benefit of being performed without the necessity of anesthesia, which reduces the cost of the procedure as well as anesthetic risk to the patient.



**A standing MRI does not require that the horse be placed under general anesthesia.**

**Computed tomography (CT)** also gives us the ability to view the anatomy of interest from multiple angles and assess injuries from a three-dimensional perspective. CT images are more similar to X-ray images, providing excellent bone detail but only limited information about soft tissue structures, in contrast to MRI. CT has the advantage of producing images in a shorter amount

of time compared to MRI. To date, when imaging the distal limb, most CT scanners require the use of anesthesia as the horse needs to be laying in either lateral or dorsal recumbency for the limb to enter the gantry. However, it may not be far off to consider that CT imaging of the distal limb could be performed in the standing sedated horse.

The relative cost to your client for these procedures is

often more than offset when the cost of "failed" therapy is considered. Many times, the cost of multiple attempts at empirical therapy is comparable to the cost of advanced imaging. This can be significant for both the financial investment in treatment (joint injections, multiple courses of shockwave therapy, systemic medications, etc.) as well as time out of training. Obtaining an accurate diagnosis will do more than help guide you to the most effective and the most efficient course of therapy. Treatment outcome is often improved, as not only will the most appropriate course of therapy be applied, but client expectations are more reasonable if they are aware of the extent of the injury and can be counseled on the likelihood of treatment success.

Lameness cases can be frustrating for both you as the veterinarian as well as the owner. However, with increasing availability and affordability of advanced im-

**Some helpful information when considering referral can be found at <http://hallmarq.net/standing-mri/referring-for-mri/>.**



aging systems, MRI and CT should no longer be considered only in the “advanced” case or for the “advanced” horse or client. The benefits

that are realized by acquiring an accurate diagnosis and prognosis can provide valuable information that ultimately gives your client

the most cost-effective and efficient means to regain soundness in his or her horse. So, the next time answers don’t initially show up

in “black and white” on your X-rays or on the ultrasound, confidently consider advanced imaging as the next reasonable step.

**CONSIDER THIS CASE:** A 9-year-old warmblood eventing mare presents with an acute and intermittent grade 3/5 RF lameness. No obvious abnormalities are seen on physical examination and there is no sensitivity to palpation or distal limb flexions. Diagnostic anesthesia of the palmar digital nerves results in 90% resolution of the lameness. At this point you decide to take radiographs, which do not reveal any significant abnormalities that can account for the horse’s lameness. You tell the owner he/she can try treating with rest and coffin joint injections or you can send the horse to the local referral hospital for an MRI. The owner elects to invest in diagnostics and the mare is sent for standing MRI of both front feet (see images below). The findings of the MRI were summarized as follows:

- In the right fore foot, there is increased signal intensity in the palmar aspect of the navicular bone on the STIR images, consistent with abnormal fluid accumulation and inflammation. (*Fig 1 & Fig 2*)
- In the left fore foot, there is mild increased signal intensity on the palmar aspect of the lateral collateral ligament of the distal interphalangeal joint on T2-weighted images and corresponding signal intensity on STIR images; findings consistent with mild, focal, degenerative injury. (*Fig 4*)
- Findings of the left fore navicular bone were similar to the right fore, although less prominent. (*Fig 3*)

It was considered the RF lameness correlated most appreciatively with an injury to the navicular bone, usually

the result of abnormal concussive forces to the foot or acute injury. The findings in the LF are likely secondary to the RF lameness, and mild degenerative changes of the collateral ligaments are commonly found in performance horses. Diagnosis: Navicular bone inflammation.

In this particular case, treatment with corrective shoeing including pads and improving breakover was applied. Systemic injection of a bisphosphonate, a short course of phenylbutazone and aspirin were instituted. Finally, injection of autologous conditioned serum in the navicular bursa was also performed. This mare successfully returned to work after a two-month rehabilitation program.

Would the findings of the MRI change your course of therapy? Would you have suspected navicular bone pain based on the lack of radiographic abnormalities? You may have chosen a similar course of empirical therapy, but it would also have been justified to inject the coffin joints and “see how it goes.” However, would the mare have returned to work as quickly? Would intra-articular coffin joint injections have been as successful as targeted therapy in addressing the osseous inflammation of the navicular bone?

Perhaps; but considering time out of work, financial investment into repeated coffin joint injections vs. cost of imaging and targeted therapy, advanced imaging with MRI proved to be a valuable tool to guide efficient and effective treatment to get the horse back to competition quickly and safely.

**RF STIR Sagittal**



**Fig 1. Increased signal intensity in the palmar aspect of the navicular bone, representing abnormal fluid in the navicular bone and indicating moderate inflammation**

**RF STIR Frontal**



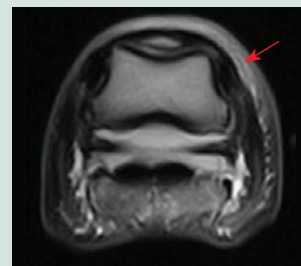
**Fig 2. STIR frontal image of the right front foot, showing increased signal intensity in the palmar distal aspect of the navicular bone and representing moderate inflammation**

**LF STIR Frontal**



**Fig 3. Increased signal intensity in the palmar distal aspect of the navicular bone, although less prominent than on the right front (see figure 2)**

**LF FSE Transverse**



**Fig 4. Mild increased signal intensity in the palmar aspect of the lateral collateral ligament of the distal interphalangeal joint**



Attaching a visual to our conceptualization of boundaries can be helpful because it makes the somewhat intangible boundary between what you are and are not responsible for easier to grasp.

# Communicating Boundaries

Boundaries are critical because they shape how we engage with the world, how we treat others and how others treat us.

By Colleen Best, DVM, PhD

We are living in a time of tremendous upheaval. COVID has resulted in marked changes to our normal behavior and routines, both in our personal and professional lives. We are frequently having to reassess what is best for ourselves, our families and our practices, part of which is determining our boundaries.

Boundaries are rules or guidelines for how we interact with the world, and as such are important because they allow us to live our lives on purpose. They are

an important part of preventive wellness strategies for ourselves. We are all familiar with comprehensive preventive

*“Boundaries are a part of self-care. They are healthy, normal and necessary.”*

—Doreen Virtue

health plans for our patients, but we rarely approach our own well-being with the same energy and focus.

While we all have boundaries, the degree to which we are conscious of them and to which we assert them will vary. Often, we only recognize what our boundaries are in hindsight. Think of a time when you felt frustrated angry or disappointed. Was one of your boundaries crossed? Noticing such feelings and understanding their source is valuable to support better knowledge of your boundaries and facilitates an enhanced ability to set them going forward.

We have many different types of boundaries. We have boundaries regarding our interpersonal relationships, some



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of which have come into sharp consideration due to COVID, such as who we are willing to interact with and how we interact with them.

Other boundaries that have come into

boundaries might have changed during the pandemic. That might include how we allocate our time, money or energy. The pandemic has amplified the resource-limited nature of our lives, and

*“Boundaries define us. They define what is me and what is not me. A boundary shows me where I end and someone else begins, leading me to a sense of ownership. Knowing what I am to own and take responsibility for gives me freedom.”* —Henry Cloud

the spotlight are those related to how we run our businesses, the businesses we patronize, and where we are willing to go. The less tangible, outward-facing

that led many of us to the need of shepherding our actions more carefully.

It's important to appreciate that we hold self-focused boundaries, too. For

instance, those boundaries that relate to our responsibilities. It is critical to recognize what we have control over and what we don't, and for us to remember that we are not responsible for the actions or decisions of other people. This is one area where asserting our boundaries can be very quiet.

## Boundaries and Self-Compassion

There are times, both in our personal and professional lives, where others intentionally or unintentionally might try to get us to accept responsibility for their actions, decisions or experiences. A classic example of this is a client who is upset about the cost of care and blames you, the veterinarian. Often, this client is really upset because he or she cannot afford the care an animal needs, and instead of accepting that responsibility, tries to blame the veterinarian.

It can be difficult not to take this on, particularly when the stakes are high and an animal is going to be euthanized due to lack of the owner's ability to afford care.

We need to practice self-compassion as we assert our boundaries quietly to ourselves, because it is natural to feel upset when we are insulted and have our motives questioned. When we are prepared and have set our boundaries ahead of time, we are better able to recognize the client's attempt to shift responsibility to us and to move past it with a minimum of distress.

Along the same lines, we need to have boundaries around our sense of self. No one else can truly know what our values are, what our intentions are, or who we really are. Knowing this and ensuring we have firm boundaries around our sense of self makes us more resilient to the opinions and comments of others.

Continuing our earlier example, clients have been known to question the intentions of veterinarians with respect to recommendations for expensive care, some even stating that veterinarians are greedy. When we assert boundaries



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around our sense of self and keep in mind that no one can know our values and intentions but us, then we are better able to prevent those suspicions and insults from affecting us.

This isn't easy. It takes practice to be able to recognize when our sense of self is being threatened and to move toward asserting a boundary before it has been crossed.

## Boundaries and Values

It is critical to appreciate that our boundaries are strongly influenced by our values, our particular needs for physical and emotional safety, our past experiences and our unique life circumstances. The boundaries that one person deems necessary might seem too aggressive for another; this is normal and appropriate.

We adapt our boundaries as we grow and change, and often we adjust our boundaries to given situations and relationships.

Overall, boundaries are rules of engagement for how we interact with the world, both in terms of how we allow the world to impact us and how we ask that the world interact with us.

There is tremendous value in taking the time to explore your values, then aligning your boundaries with them. Once there is an understanding of what one's boundaries are, then begins the work of asserting them with others and yourself.

It can feel rude or selfish to have boundaries, never mind assert them to others. Communicating openly with others about our boundaries is a gift to all involved. It facilitates strong relationships and diminishes the risk of conflict and resentment. We need to be aware that boundaries are often difficult for others to predict or guess, and proactively sharing them is the best way to facilitate transparency and positive outcomes.

Try the following when looking to be intentional about boundary-setting:

1. Explore your core values; then deter-

mine the boundaries that align with them.

a. You can start brainstorming your own list of values, or use some of the tools readily available by Googling "values clarification exercise." Take a few of the core values you'd like to work with and write down how that value is manifested in your daily life. Then write down what boundary you need to meet that given need and respect that value. For instance, if you value quality time with your partner, one related need you might have is a weekly date night. Therefore, you set a boundary that you don't schedule calls past 4 p.m. on "date night Fridays," and you reschedule date night to Thursday when you are on call Fridays.

b. Identify boundary infractions: There's a lot to be learned by taking the time to consider when our boundaries have been crossed. Think back to a time when you felt angry or resentful of someone. Write down all the details you can remember about what happened. Can you trace back the source of those frustrations to feeling infringed upon in some way? Was there a boundary that was compromised? Once you can identify that, you are able to switch gears to determining how to assert that boundary going forward.

2. Practice asserting your boundaries.

a. Sharing your boundaries with others proactively can help avoid the conflict and negative experiences that come when our boundaries are crossed. It can feel overwhelming to think of asserting a boundary, and it can be difficult to strike a balance between assertive and aggressive. Taking the time to practice how you could communicate them in a firm, respectful and compassionate way to those involved makes conversations easier. For instance, when taking on a new client, you might want

to share your boundaries regarding being contacted outside of work hours: "I know that all horse vets are different when it comes to how we like to stay in touch. I want to let you know the clinic has an answering service for after-hours emergencies. That is the best way to reach the on-call veterinarian. I do not answer work texts or calls outside of work hours unless I am contacted by the answering service. This ensures you will receive prompt care and that I am able to be at my best when I'm taking care of Crosby."


3. Picture hula hoops.

a. Attaching a visual to our conceptualization of boundaries can be helpful because it makes the somewhat intangible boundary between what you are and are not responsible for easier to grasp. When you encounter a situation where boundaries are getting blurred (e.g., a client is blaming you for the high cost of procedures and his or her inability to pay), picture everyone involved holding a hula hoop. Then visualize the contents of the conversation as items in each person's hula hoop. Remembering that we all own our own decisions, actions, opinions, ideas and mistakes. Good boundaries dictate that the hula hoops don't overlap.

## Take-Home Message

Boundaries are critical because they shape how we engage with the world, how we treat others and how others treat us.

We must appreciate that our boundaries are not the same as someone else's boundaries, so we must communicate them clearly. That means we first must understand our own values and boundaries. Sometimes it takes practice to communicate a boundary to a client (or associate or spouse).

Remember, it is not selfish to protect our values and set boundaries to protect ourselves. 



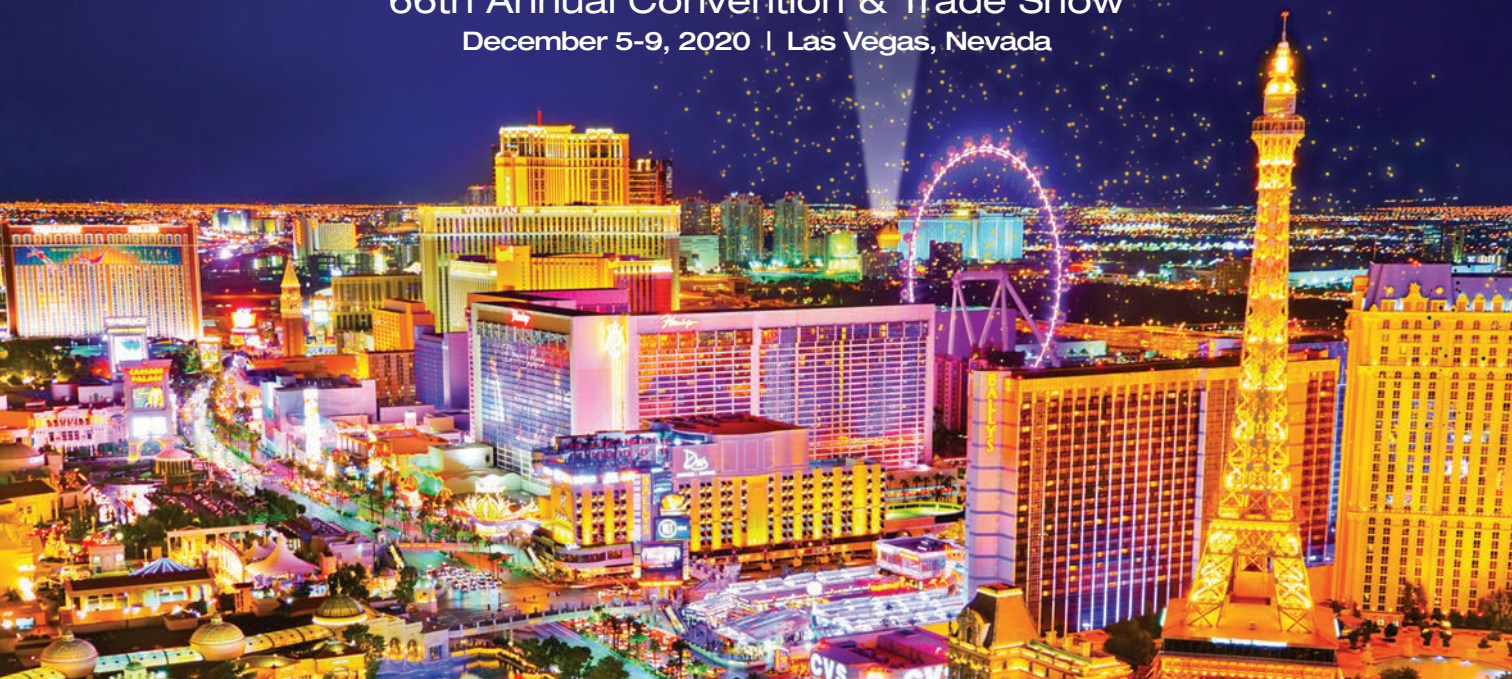


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# Reclaiming Vaccinations

Immunization and herd immunity are critical parts of keeping horses healthy, but it takes knowledge to use them to their best effect.

By Nancy S. Loving, DVM

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**W**ith the advent of a plethora of sophisticated medical advances and available technology, it is not surprising that equine immunizations are no longer a mainstay of equine veterinary practice. Decades ago, vaccinations were one of the driving forces for getting practitioners onto clients' properties to care for their horses. Yet immunization and herd immunity are still critical parts of keeping horses healthy.

Many horse owners still call their veterinarians for "spring shot" appointments. However, there are many horse owners who purchase vaccines from animal health retail outlets and administer the vaccines themselves. Some might forego vaccination altogether.



**Vaccination programs to keep horses healthy require input from veterinarians.**

You—as the primary equine health provider—can reclaim vaccinations as part of your overall practice culture and as a means to improve your bottom line with proper client education.

## Types of Vaccinations Needed

It is always good to be able to quote a reliable source when talking to horse owners about vaccinations. Horses should get the vaccines that they need for their locations, uses and exposure risks.

The American Association of Equine Practitioners (AAEP) notes that there is not a one-size-fits-all vaccine program. Decisions about which vaccines to give are based on risk of disease, consequences of disease, effectiveness of vaccination products, potential for adverse reactions and the cost of immunization compared to the cost of disease.





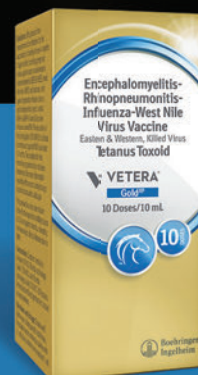
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**Your expertise and experience are even more valuable when determining a vaccination schedule that is individualized to the horse's location, risk factors and travel schedule.**

Because the use of antibody titers or other immunological measurements is often inconclusive about effective protective immunity against specific diseases, it is not recommended to base administration of vaccine boosters on these tests. In other words, just because the animal tests positive for a titer doesn't mean there is scientific proof it is protected against the disease.

One standard annual protocol recommended by veterinary organizations is the importance of administering core vaccines to every horse. AAEP and the American Veterinary Medical Association (AVMA) describe "core vaccines" as those "that protect from diseases that are endemic to a region, those with

potential public health significance, required by law, virulent or highly infectious, and/or those posing a risk of severe disease." For horses, these immunizations include:

- Eastern and Western equine encephalitis (EEE and WEE)
- West Nile virus (WNV)
- tetanus
- rabies

Every horse across the United States should receive each of these vaccines annually at a minimum. All vaccines—core or risk-based—begin with a primary series of two to three injections spaced three to five weeks apart (you can show horse owners the manufacturer's recommendations if necessary). The

vaccines are then boosted once or twice annually, depending on the timing and degree of exposure.

EEE, WEE and WNV are transmitted by mosquitos, so those might need twice-annual boosters in certain geographic locations. Rabies and tetanus only need to be given annually in most circumstances.

## Types of Vaccines Recommended

Besides the core vaccines, other vaccines might be relevant to give to client horses based on geographic location and risk. This is where your expertise and experience become even more valuable to your clients.

Vaccines are available for diseases that are more likely to affect traveling and competing horse populations, horses that congregate in large groups away or at home, or in special circumstances where a particular disease might be endemic. Recommendations to vaccinate against specific diseases are related to the risk of horses encountering exposure, during sudden outbreaks, or based on breeding disease risks, as some examples.

Risk-based vaccines that are available for horses include:

- equine influenza (EIV)
- equine herpesvirus (rhinopneumonitis, EHV-1 and EHV-4)
- equine viral arteritis (EVA)
- anthrax
- botulism
- leptospirosis
- Potomac horse fever (PHF)
- snake bite
- strangles
- rotaviral diarrhea
- Venezuelan equine encephalitis (VEE)

Two risk-based immunizations most commonly given on a regular basis are those that protect against equine influenza and rhinopneumonitis. To





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compete in FEI (Federation Equestrian International) or USEF (United States Equestrian Federation) events, competing horses must receive equine influenza at least twice yearly with proof of documentation of proper administration of a primary series and subsequent boosters. These vaccines must be administered by a licensed veterinarian.

FEI rules state: “Horses must be vaccinated against equine influenza in order to compete at FEI events. Every horse’s passport is checked at events to ensure that the horse has been vaccinated according to the FEI Veterinary Regulations; therefore, all equine influenza vaccines that have been given to the horse must be recorded in the horse’s passport.”

USEF also requires influenza and additionally requires proof of equine herpesvirus immunization. Since 2015, USEF policy states: “All horses entering the grounds of a Federation-licensed competition must be accompanied by documentation of Equine Influenza Virus and Equine Herpes Virus (Rhino-pneumonitis) vaccinations within six months prior to entering the stables.”

Administration of others on the list of risk-based vaccines is wholly dependent upon presence of that disease in your area and each horse’s activity. For instance, a horse that lives in an irrigated pasture and only rides in an arena isn’t likely to need snake bite vaccine, but it might need protection against diseases carried by mosquitos that thrive in irrigation puddles.

For horses living along the border of Mexico, there might be value in immunizing against VEE. Breeding horses are more likely to receive EVA immunizations. Foals are candidates for rotaviral diarrhea and botulism vaccines. Horses residing near aquatic areas might benefit from leptospirosis or Potomac horse fever vaccines. Areas with known outbreaks of *Streptococcus equi* are



ARND BRONKHORST PHOTOGRAPHY

### **Some events or associations require specific vaccinations prior to competition.**

more likely to necessitate immunization against strangles.

These risk factors help veterinarians decide what to immunize against and how frequently to administer those protections. They also are good points to share with clients when establishing which vaccines a horse should receive.

Some diseases—such as equine herpes myeloencephalopathy (EHM) or vesicular stomatitis virus (VSV)—don’t have specific vaccines available at this time. For those diseases, a veterinarian has an important role in educating clients about biosecurity measures.

### **The Benefits of Veterinarian-Administered Vaccinations**

To achieve optimal client buy-in and vaccine protection, it is useful to educate clients about the benefits of having them administered by a licensed veterinarian.

Vaccines must be kept under consistent refrigeration at all times to maintain their efficacy. Buying vaccines from a reputable source implies that they are

kept appropriately under refrigeration and have not lost their potency. Warehouse or wholesale outlet companies, feed stores or veterinary bulk supply outlets won’t necessarily guarantee proper handling of these products.

It is important to impress upon clients that while they might feel like they are saving money by purchasing from sources other than a veterinarian’s office, they don’t have the assurance that their horse will receive adequate immunity if vaccinated with a poorly-maintained product. In most cases, there isn’t really any way to determine if a vaccine has lost its efficacy.

Veterinarian-administered vaccines provide more assurance that:

- the vaccine comes from a reputable outlet;
- the vaccine has been handled properly and kept at proper temperatures during the multiple transfers from manufacturer to the distributor to the veterinarian’s office to the horse;
- the vaccine is not outdated;
- the choice of vaccines is the most appropriate for each horse’s unique geographical location and riding/competition pursuits.

Safe techniques used by veterinarians for administering vaccines offer the least risk to a horse and protect owners from being injured by a horse that objects to injections. Should transient side effects occur—muscle soreness, fever, malaise or an uncommon post-injection abscess—veterinarians can report these to the USDA and/or the manufacturer. In some cases, there might be financial compensation to the horse owner for significant illness events related to an immunization product if the product was administered by a veterinarian. This reporting and compensation process is not as likely to happen with owner-administered vaccines.

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<sup>1</sup> West Nile Virus Challenge Vaccine Efficacy, BI study number: V9 2009 WNV 12mo DOI

<sup>2</sup> Equine Influenza Challenge, BI study number: 01 V9 6mo DOI CH103

<sup>3</sup> Lack of Interference - Influenza Challenge, BI study number: 2012-001 Inf. Data on file at

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ally resolve within 48-72 hours. When the purest vaccine products available are used, fewer than 2% of horses have any sign of having been immunized. Based on the sheer numbers of horses immunized each year, veterinarians have knowledge of which manufacturers produce vaccines with the least likelihood of adverse reactions in individual horses.

Armed with knowledge that an individual horse has developed an adverse reaction from a previous vaccination, a veterinarian is able to administer an anti-inflammatory (NSAID) medication at the time of immunization to mitigate possible side effects. In some cases, a veterinarian can suggest separating out various vaccines to give at different times rather than immunizing with multiple vaccine products or multivalent products at one time. Or the veterinarian might recommend a different company's product.

Insured horses might have requirements of veterinarian-administered vaccinations. Medications, including vaccines, have the potential to induce a health problem or life-threatening or fatal anaphylactic reaction. If that occurs and the vaccine (or medication) was not administered by a veterinarian, an insurance company might not honor the horse owner's insurance claim.

Another benefit of veterinarian-administered immunizations is that you'll know for a fact that certain illnesses aren't likely to be part of a complaint when a horse isn't doing right. This is especially important when considering rabies as a rule-out to a non-specific, acute problem. This gives peace of mind for both practitioner, horse owner and anyone who has come into contact with a sick horse.

Maintenance of a vaccination schedule is critical to ensuring optimal protection in an individual horse as well as maximizing herd immunity against

infectious diseases. Veterinarians play a key role in ensuring that a primary series of immunizations and boosters are administered according to manufacturer protocols. Research has shown that lapses in vaccination are concerning when the primary course of immunization is interrupted and not completed or if a booster vaccination is not given annually or per manufacturer's recommendations [Paillot, R.; Marcillaud, Pitel C., et al. Equine Vaccines: How, When and Why? Report of the Vaccinology Session, French Equine Veterinarians Association, 2016, Reims]. The report concluded that "Consequences of lapsed immunization is likely to be inversely proportional to the duration of immunity of the last vaccine administered."

As part of the service of providing vaccines to client horses, vets schedule appropriate follow-up visits to the farm to administer vaccines according to the necessary schedule to comply with manufacturer recommendations. Older horses, especially those with PPID, might need more frequent boosters of certain vaccines. Equine practitioners have the ability to make those judgments based on an individual horse's needs.

In the event of an infectious disease outbreak, veterinarians are informed by state veterinary officials of the presence of disease and the need for emergency vaccinations. In addition to disseminating this information to clients, equine veterinarians are able to advise clients about relevant biosecurity practices and surveillance to further keep their horses safe from a disease outbreak.

## **The Business of Wellness Includes Vaccinations**

Preventive veterinary care with wellness exam visits can provide the best in health for your clients' horses. In addition to providing good immunization and deworming protocols, the

many little details of physical and behavioral health, dietary needs, dental care, soundness concerns and hoof care are considered and attended to at the time of a wellness exam. This maximizes each horse's quality of life through prevention and early treatment of disease and enables the horse to give the best performance in its equine athletic pursuit.

This type of practice culture boosts clients' appreciation of their veterinarians and inspires them to rely on their equine practitioners for advice and counsel.

There are many ways to market one's equine veterinary practice. A wellness program rolls a bundle of services into one package with services that should be performed for most clients' horses.

Some services included in wellness services are:

- vaccinations twice a year, or as needed
- deworming
- fecal egg count
- physical exams
- body condition evaluation
- nutritional consultation
- EIA test
- health certificate
- microchipping
- dental exam
- dentistry with sedation
- sheath cleaning

It is possible to set up varying levels of wellness programs that include some or all of these preventive care services. Ideally, all wellness programs should include vaccinations, fecal egg counts and deworming. Bundling these services, including vaccinations, into a specific program gives clients a "package" for using your services once or twice a year. In many cases, the package eliminates the ambulatory call charges, which decreases a horse owner's financial outlay.

Being part of a wellness program also can make clients feel like they are receiving special attention. A wellness package



SYNDROME	VET RECOGNITION	OWNER RECOGNITION
Dental abnormalities	96%	24%
Cardiac murmurs	20%	0.5%
Lameness	50%	23%
Loss of range of motion	90%	0%
Hoof abnormalities	80%	27%
Eye lesions	94%	13%
Skin lesions	71%	7%
Respiratory disease	25%	13%
Body condition score fair correlation to vet		
Hair coat condition moderate correlation to vet		

can be customized for different horse age groups—pre-teen, teenage or senior horses—since different age groups might require different services and/or frequency of services.

Often, a wellness package is paid for in advance of the spring season, and this improves cash flow for a practice, especially during winter lulls in practice. Having a client sign up for this program also helps to spread out timing of services so some work can be performed during slower seasons rather than having it all piled up in the busiest months.

Ideally, a wellness package should generate 10-15% profit beyond costs of supplies, overhead, professional fees and veterinarian compensation.

An important feature of wellness packages is that they get the veterinarian onto the client's property at least once or twice a year. This facilitates a practitioner's ability to attend to more issues than just preventive care.

Equine veterinarians are trained to pick up subtle and obvious details about a horse's health, which might necessitate further examination and testing while also affecting the timing of routine immunizations. Clients often have questions and bring up other concerns that have the potential to generate additional fees for additional work, such as lab testing, pregnancy evaluations or lameness exams, as a few examples.

Many equine issues are not identified

by an owner and won't be unless the horse is given a comprehensive veterinary examination. Research has shown that there are differences between owner-perceived health of horses and actual veterinarian findings, particularly in geriatric patients [Ireland, J.L., et al. Comparison of owner-reported health problems with veterinary assessment of geriatric horses in the United Kingdom. *Equine Veterinary Journal* Jan 2012; doi: 10.1111/j.2042-3306.2011.00394.x]. On this page are a few examples from that research (see chart above).

There is little doubt that under-recognition of problems results in delay of appropriate treatment. Educating clients about the possibility of early identification of health issues, including subtle changes associated with PPID, can help keep horses alive longer and with a better quality of life. Wellness exams provide an opportunity to identify issues in advance of major problems.

To motivate clients to sign on to a wellness program, you'll need to advocate and communicate about this program verbally on the phone, in person, through your website, email notifications, social media, direct mailers and mailing stuffers that accompany billing invoices. Educate horse owners and trainers to recognize the value of preventing health problems—the results are healthier, more active horses that achieve better performance with fewer

veterinary visits and costs.

Good communication between you and a client helps to inspire client loyalty while also enabling you to carry out a mission of improving health and quality of life for your equine patients. The trust and partnership that develop from an established relationship between veterinarian and horse owner keeps the lines of communication flowing well.

## The Economics of Vaccination

There are several ways to look at the economics of vaccination. One is to ascertain how reclaiming vaccinations in your practice can affect your bottom line.

As described above, wellness exam packages are one way to market this service. Or you can simply schedule spring and fall immunizations with your clients through reminders sent via email, text or postal service. Every personal interaction with a client and his/her horse is an opportunity to identify other issues that can maximize horse health while generating more revenue.

Additionally, it is helpful to educate your clients about biosecurity practices to limit disease on a farm or while traveling. You also can educate clients about the value of herd immunity that is optimized through regular immunization programs of all horses at a farm or facility.

Another way of looking at the economics of vaccination is through the cost to the equine industry of morbidity and mortality related to outbreaks of disease. Not only is an infectious disease a major welfare concern, but it has significant economic implications.

The impact on the equine industry due to equine herpes myeloencephalopathy (EHM) outbreaks affects travel, training, competition and sales all over the nation. There is no currently available vaccine for this malady, but it serves to make a point about how an outbreak

of infectious disease can shut down movement of horses for a lengthy period of time. This shutdown exacts impressive costs throughout the industry.

EEE, WEE and WNV are not contagious between horses, but they are associated with high mortality rates: EEE 90%; WEE 40-50%; WNV 30%. Hospitalization of a serious case can run \$2,000-\$5,000, with no guarantees of successful resolution.

Compare this with the cost of immunization of a horse for less than \$150 to provide a primary series plus boosters [Humblet, M.; Vandeputte, S., et al. Estimating the economic impact of a possible equine and human epidemic of West Nile virus infection in Belgium. *Euro Surveillance* 2016, 21(31): pii = 30309; doi 10.2807/1560-7917.ES.2016.21.31.30309].

Horses surviving WNV often have persistent neurologic deficits, adding to economic losses of performance.

In the 2002 outbreak of WNV in Colorado and Nebraska, the financial impact based on laboratory-confirmed cases was sobering. A study by the USDA looked at the numbers [Economic Impact of West Nile Virus on the Colorado and Nebraska Equine Industries: 2002, published April 2003]:

- total cost attributed to death or euthanasia: \$600,660
- revenue lost due to lost use (average of 22 days): \$163,659
- treatment costs: \$490,844
- vector (mosquito) control costs: not available, but likely were significant
- vaccination costs: estimated to be at least \$2.75 million for the two states

Vaccination against WNV is now a common component of spring immunizations. There are at least three products available with good efficacy against this virus. The cost of immunization pales in comparison to costs of individual horse morbidity, treatment, on-going deficits or death.

Australia experienced an intense outbreak of equine influenza (EIV) in 2007, with significant impact on the economics of their equine industry. Horses in Australia were generally not immunized against EIV, so a totally naïve population experienced significant morbidity (75,000 horses) over a five-month period. The Australian government spent the equivalent of \$63 million USD for eradication of the virus and \$164 million USD supporting the equine industry. These expenses were associated with movement restrictions, cancellation of equine events, and vaccination of at-risk horses. The disruption to all normal equine activities involved other incalculable costs, including loss of training, sales, breeding services and pregnancy rates.

A New Zealand article looked at the benefits of control strategies that implement routine vaccination against EIV [Rosanowski, S.M.; Carpenter, T.E., et al. An Economic analysis of a contingency model utilizing vaccination for the control of influenza in a non-endemic country. *PLOS ONE* Jan 2019; doi: org/10.1371/journal.pone.0210885].

Use of a suppression strategy, i.e. immunization of susceptible horses, provides an economic benefit:

- Vaccination reduces the outbreak duration so horse activities can resume more quickly.
- Trainers and owners benefit through the ability to continue working with their horses and engaging in competitive activities.
- Sales of horses could return to normal more quickly with reduction in outbreak duration.
- Breeding could return to normal more quickly with reduction in outbreak duration.

Not only does an infectious disease outbreak affect the general economy of the equine industry, but since racehorses and competitive sporthorses in all

equestrian pursuits develop a commercial value based on their performance history, those values are diminished. For recreational horses, disease infection has an impact on a horse owner's finances related to medical care of the horse and time lost in pursuit of equestrian activities. It also has an emotional impact for horse owners who view their horses as members of the family.

## Take-Home Message

In decades past, horse owners and practitioners had to experience the heartbreaking events of horses suffering and dying from encephalitis, tetanus, rabies and other infectious diseases. Anyone witnessing such profound illness from one of these diseases isn't likely to forget it and will strive to ensure immunization in all their clients' horses.

Horse owners and equine practitioners take a lot for granted today due to the abundance of affordable and efficacious vaccines against deadly diseases and other infections that affect a horse's performance or quality of life. Perhaps the approach has been too casual about an equine veterinarian's role in ensuring that all horses are immunized for the core vaccines at the very least? Perhaps this is a good time to impress upon clients the value of effective protection and herd immunity.

The COVID-19 outbreak serves as a deadly reminder of what happens to a population when no vaccine is available. The message is loud and clear, and veterinarians can capitalize on the lessons learned during this human pandemic to inform and counsel clients about best preventive practices that include veterinarian-administered immunizations.

Vaccinating all horses in your practice helps not just your bottom line, but serves to maximize health of your equine patients and establish herd immunity that impacts the entire equine industry. **EM**





# Alternatives to 24/7/365 Veterinary Practice

There are alternatives to feeling boxed in with non-stop emergency work on top of long days.

By Nancy S. Loving, DVM

**Y**ou are probably familiar with the following scenario: You just walked in the door after a long, grueling day of farm calls. You're thinking about a nice, hot shower, some dinner and relaxation before starting in on the finish of your day with call backs, medical recordkeeping and restocking the truck. This calm, dream evening is shattered by the phone bringing you

back to the realities of being available on call 24/7/365.

Do you ever feel like the minute you are embarking on a break from work or are about to walk out the door, the phone (or the pager—yes, some vets still have these) goes off, demanding your attention? The inevitable emergency often comes at the least-welcome moment—while at your kid's baseball or soccer game, your daughter's graduation,

attending a friend's wedding, while at dinner with family, at the movies, riding your horse, leaving for vacation ... the list of inopportune moments is endless.

Many times, it is a call for an "emergency" that could have been attended to days ago or at least during regular business hours. The weekend is upon you, and now the client is concerned about waiting until Monday. Or the client puts his or her own work first knowing that



**There are alternatives to feeling "boxed in" by non-stop emergency work on top of long days serving clients.**

you will respond to an after-hours call, which costs less than if he or she had missed work during regular business hours. Anyone in the practice of equine medicine is all too familiar with these scenarios.

True emergencies exist. Yet have you ever evaluated just how many of those after-hours calls to which you respond are true emergencies?

Over my first two decades of full-time practice, I counted up all the emergency calls to discover that only 10% of "emergency" calls were truly emergencies that just couldn't wait until regular business hours. If this assessment is in the same league as what you experience, that means you spend a lot of windshield time and valuable evening and weekend time that could have been avoided.

Working in a multi-doctor clinic is a help as it splits emergency call time among practitioners, thereby easing the burden. But being a solo equine practitioner makes you "chief cook and bottle

washer." And round-the-clock service is a recipe for burnout.

Our most valuable commodity is our time, and it is not a renewable resource, as there is a finite amount of it in our lives. Today's equine veterinary practice is a lifestyle, often precluding other personal pursuits and at the expense of family time. We spend so much of our professional lives looking after other peoples' problems and animals that sometimes we forget to look after ourselves.

What can you do to devise a plan to give yourself relief from the 24/7/365 obligation to minister to your patients and clients? Read on!

### **Setting Limits Is Liberating**

Veterinarians pride themselves on educating clients about the latest advancements in equine medicine and surgery. Why, then, is it so easy to overlook the need to educate clients about professional boundaries?

Our time and resources are tugged on from every direction—by clients needing attention, by our families deserving attention, by professional organizations requesting our attention, and by ourselves trying to live up to expectations of our personal performance.

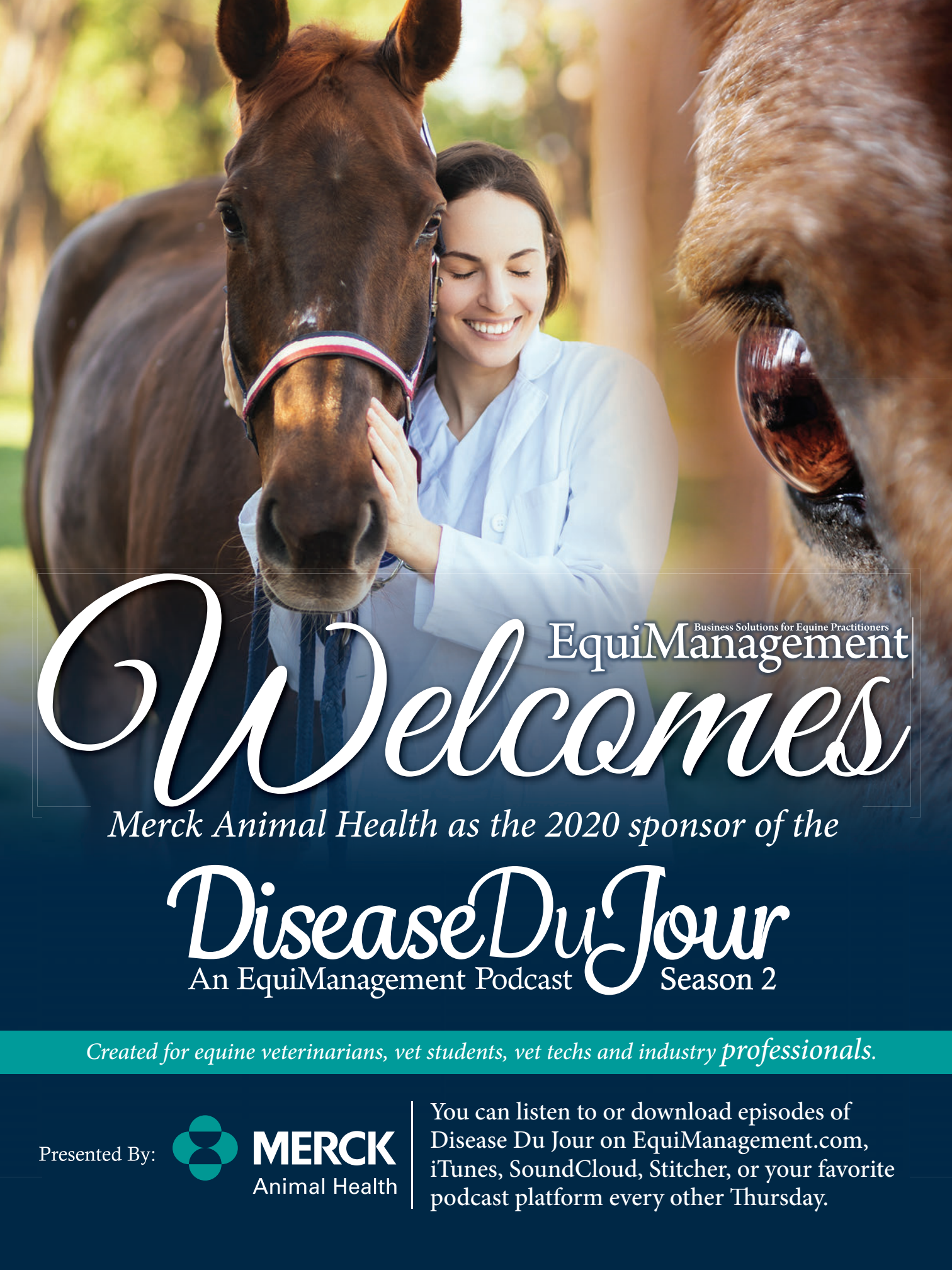
One solution is to set limits and stick with them.

From a personal experience following a family death, after 20 years in practice, I announced to my clients that I would be relegating night and weekend calls to colleagues. I expected a lot of push-back and complaints. Instead, the most common comments I heard were "What took you so long?" and "It's about time."

The degree of understanding by my clients was staggering and totally unexpected. Rather than "abandoning ship," most went along with my decision and remained loyal to my practice.

I wonder if we often don't give our longstanding clients enough credit for recognizing the strain that we are under





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to accommodate their needs.

The hardest part of this strategy is the ability to say “No” when a client calls for your help outside of regular business hours. It is helpful to take it to heart that “No” is a complete sentence. Just as it takes practice to set limits, it takes practice as well as a bit of politics to say “No.”

One way to ease this proclamation is to provide alternatives to client requests and demands. Information handouts are helpful, as are specific phone numbers of emergency veterinary clinics. It helps to view the times when you say “no” as an interaction with an *opportunity* to educate clients. With time, it becomes easier to stick to the plan, especially once you get a taste of evening and/or weekend freedom.

It is important to send out notifications to your clients and include on your website just what your specific

hours will be. You might want to do part-time emergencies in addition to routine daily care. You might want to limit your time to scheduled appointments only. Perhaps you prefer to open for business later on some days and carry your practice hours into the evenings on those days. There are many ways to tackle the timing of the days and hours that your practice is available. You might consider offering a survey to your clients to identify their most desirable times for appointments.

Regardless of how you decide to manage your time, your clients need advance notice so that they know what to do and who to call when faced with an equine emergency. Nothing is worse than finding out at the very moment of need that a favorite veterinarian is not available. When arrangements with other practitioners are set up in advance, resentment by all parties is minimized.

## Collaboration with Other Practices

Collaborating with other practices is a strategy that requires effective communication, not only with your clients but also with the colleagues or university veterinary services to whom you plan to send the emergency calls. There must be cooperation between all parties and agreement by others to take on this emergency load. Sometimes there is a new practitioner in the area who is eager and willing to take as much work as can come his or her way.

It is nice if there is a consensual arrangement that once your client's emergency is handled, the case is turned back over to you the next day. Clients appreciate the arrangement because they know their primary equine doctor is more rested and no longer as rushed at appointments. They know their horses receive conscientious first aid care for after-hours emergencies through the back-up veterinarian, and they know their primary doctor is available for any necessary follow-up care.

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emergency work is not only interesting, but financially rewarding. It also gives the more experienced practitioner an opportunity to be a mentor. This can be a win-win for everyone. Not only is it a natural evolution, but it is also a smart decision to pass the torch to fresh, energetic younger veterinarians who are motivated to practice as much as they can.

## Relief Veterinarians

In many areas, some equine practitioners actually prefer emergency and relief work, since it offers more financial advantages than daily practice life. Additionally, doing relief work enables a practitioner to work as much or as little as desired, thereby making work-life balance more attainable.

You might decide that rather than hiring a relief veterinarian, you'd rather serve as one and pursue that line of instead of managing the constancy of a full-service, full-time practice.

## Educational Efforts

Horse owners are usually eager to learn just about anything about their horses' health. Upon discovery that most "emergency" calls were, in fact, not critical, I put together a pair of two-hour Power-Point programs and presented them to the local equine community through the local horse owners' association.

The association advertised, set up the venue, got a small fee from non-member attendance, and I enjoyed presenting a comprehensive slide show to visually describe what situations constitute true emergencies and what owners can do to manage something less serious until morning. I stressed that if there is any doubt about what is and what isn't an emergency, they should call, text, email and/or send photos to ensure that they are making the right decision to wait. I assured them that phone calls (or electronic communication) were always welcome. This provides clients with a huge sense of relief that they aren't just left adrift.

There is no doubt that such educational efforts in horse owner self-sufficiency cut down on fire-engine practice dynamics and the resultant emergency service income. Go through your receipts to see just how much income that amounts to. Then decide if rest and work-life balance are worth foregoing a portion of emergency service practice revenue.

My experience is that the revenue wasn't missed, but the break from the physical and mental demands was extremely welcomed.

## Job Sharing

For some, the rigors of equine practice with the long hours, physically exhausting work and lower revenue than small animal practice are just not measuring up to their dreams. In some cases, joining a group practice is a good solution to this problem.

Or you might consider teaming up with one or more solo equine practitioners to share emergency duties. This can be rewarding not just for time off, but also because of collaboration on difficult cases and sharing a love of equine practice.

## Alternative Practice Pursuits

Through the intensity and depth of the veterinary educational experience, we are fortunate in how many doors of opportunity are available to do just about anything with this knowledge set. Other professional paths are there for consideration.

Some practitioners have found their calling not only as practitioners, but also as effective organizers, committee members, communicators, educators, writers, illustrators, researchers, politicians, entrepreneurs, administrators and business consultants—all serving with a focus on veterinary medicine.

Other pursuits in the equine veterinary medical field include working in research, taking jobs with pharmaceutical companies or industry, or teaching, to name a few.

## Changing the Culture

It really does take a community effort to raise a group consciousness, and the onus of responsibility for improving the situation for all equine veterinarians falls on each practitioner's shoulders.

If client demands are accommodated to service routine appointments in the evening or after hours, then it is not hard to see why clients would expect every veterinary "professional" to do the same, and to be disappointed when one does not. This doesn't necessarily speak to professional dedication as much as it does to two other possible characteristics: 1) the inability to say no and 2) aspirations of increased financial compensation.

This leads to a trade-off, with quality of life being exchanged for work and money, at the expense of personal time and time with our family members. This does affect all equine veterinarians. Unfortunately, it appears that the veterinarian who sets boundaries "doesn't care" or "isn't dedicated to helping animals," when, in fact, he or she might only be exhibiting self-preservation.

## The Ultimate Goal

An older vet colleague once said to me, "I never miss a meal, but some of them come awfully close together!" How true this is for an equine practitioner who puts in long, nonstop hours ministering to patients and clients.

That said, there are alternatives to feeling boxed in with non-stop emergency work on top of long work days during regular business hours. Look at the many possible avenues you can take to put your work-life balance in order, then try a change to see if a new schedule or approach to practice is a good fit for you.

The desired goal is that time be allocated appropriately between business and your own life. Without the pervasive element of fatigue, it is easier to do a better job of practicing veterinary medicine without burning out the passion. **EM**

# Research Spotlight: Equine Herpesvirus

As horses begin to circulate more to events and shows, veterinarians need to be aware of the potential of equine herpesvirus infections.

As the competition season begins for many riders in the United States, it is particularly important to implement increased biosecurity measures against infectious disease. One of the more concerning outbreaks to control is that of equine herpesvirus myeloencephalopathy (EHM, or neurologic herpesvirus) caused by equine herpesvirus type 1 (EHV-1).

Usually horses are infected with herpesvirus at an early age, with estimates that 80-90% of the horse population has encountered herpes exposure before the age of 2. Herpes viral presence persists for the life of a horse following the initial infection. It is common for horses to be infected with both EHV-1 and EHV-4. However, EHV-4 is not associated with viremia, so there are rarely non-respiratory disease manifestations following EHV-4 infection.

Equine herpesvirus has been able to adapt within the horse host and thereby undergo a period of latency during which time an affected horse shows no clinical signs of infection, yet still can actively shed virus. EHV-1 is highly infectious and can be transmitted through fomites, aerosols, an aborted fetus or placental parts, or through direct horse-to-horse contact. Broodmares might

provide continuous horizontal exposure from dam to foal, particularly if the virus underwent viral recrudescence from stress associated with pregnancy and foaling.

In horses, EHV-1 has the ability to infect many cell types: endothelial cells of inner organs, respiratory epithelial cells, and mononuclear cells in lymphoid organs and peripheral blood. Latent virus can “hide out” in lymphocytes

*It is estimated that 80-90% of the horse population has encountered herpes before the age of 2.*

and/or sensory nerve cell bodies within the trigeminal ganglia. Reactivation of virus—particularly during periods of stress—enables it to spread to susceptible horses through the respiratory tract. Not all “infected” horses show signs of illness; some are simply silent viral shedders.

With about 10 million horses living in the United States, this virus has the potential to create a huge economic impact on the equine industry. In its respiratory form, EHV-1 leads to fever, respiratory

disease, and interrupted training and competition schedules. Silent shedders transmit virus to immunologically naïve individuals. The virus also is known for its propensity to cause abortion in the last trimester. And of greatest concern is that it is responsible for outbreaks of severe neurologic disease—equine herpesvirus myeloencephalopathy or EHM—that are potentially fatal, or at the very least require quarantine of large groups of exposed horses. That quarantine interrupts training and competition schedules as well as travel.

Within one to three days of exposure, the virus replicates in respiratory epithelial cells—nasal and mucosal cells—to result in viral shedding. A sick horse displays nasal discharge, coughing, depression, anorexia, and at times enlargement of retropharyngeal lymph nodes. In some cases, particularly in foals, EHV-1 respiratory infection also creates ocular lesions of chorioretinitis or uveitis.

A horse previously exposed to, or immunized against, EHV-1 usually experiences less clinical severity of respiratory disease and for a shorter duration. Usually the respiratory form runs its course within a couple of weeks, although occasionally individuals can develop mild forms of equine asthma.

Experimental infection demonstrates that within 12 hours post-exposure, the





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**Within one to three days of exposure to the virus, it replicates in respiratory epithelial cells to result in viral shedding. A sick horse displays nasal discharge, coughing, depression, anorexia and at times enlargement of the retorharyngeal lymph nodes.**

virus is detected within the regional lymph nodes of the respiratory tract, likely due to interaction with the host immune system that triggers a response with inflammatory cytokines. While the cytokine response might be helpful to elicit an immune response programmed to eliminate viral antigen, it might also induce proinflammatory cytokines and activate coagulative responses that are counterproductive to defeating the consequences of infection.

From the upper respiratory tract, EHV-1 is able to invade more deeply

into the tissues via infected monocytes. From there, it enters the reticuloendothelial system and the lymphatics to infect circulating leukocytes and endothelial cells of blood vessels. Once viremia develops, EHV-1 has the potential to enter the pregnant uterus or to invade the central nervous system to create myeloencephalopathy. Effects in the pregnant mare result in spontaneous abortion from endothelial cell invasion generally within nine to 13 days following infection or reactivation from latency.

EHV-1 is also able to cross the blood-testis barrier to be shed in semen for several weeks up to a month following viremia. Studies have identified monocytic-lymphocytic infiltrates and perivascular accumulations similar to those found with EHV-1-infected endometrial tissue and central nervous system tissues of EHM cases.

About 10% of EHV-1-infected horses develop equine herpesvirus myeloencephalopathy. When it occurs, it appears one to two weeks after infection with or without respiratory signs. The vascular system of the central nervous system is affected through cell-associated viremia even if a horse has high levels of circulating antibodies.

The vascular endothelium might be damaged directly during viral replication and/or from immune complexes formed between EHV-1 and antibodies. These conditions lead to thrombo-ischemic necrosis of the microvasculature of the brain and central nervous system. It is reported that “there seems to be no satisfactory scientific explanation for the variable incidence of EHM and different clinical manifestations observed during outbreaks of EHV-1.”

Based on recent outbreaks, it is thought that a currently circulating neuropathogenic EHV-1 strain has evolved into a more pathogenic strain.

Current EHV-1 vaccines have no ability to combat EHM. An effective vaccine must have the ability to block cell-associated viremia to deter entry of virus in the uterus or central nervous system. The one thing that EHV-1 recombinant vaccines might accomplish is to reduce initial nasal viral shedding in vaccinates. One report recommended that the industry should “vaccinate

every horse that is at risk of exposure to EHV-1 to help reduce the severity of EHV-1-related clinical manifestations.”

### Animal Trust Herpes Vaccine Efforts

The Animal Health Trust in the United Kingdom is working to develop a vaccine that is protective against abortigen-

*It is thought that a currently circulating neuropathogenic EHV-1 strain has evolved into a more pathogenic strain.*

ic and neurologic equine herpesvirus infection. Efforts to this end through an Equine Industries EHV Vaccine Steering Group will continue over the next four years, primarily investigating a modified

live viral (MLV) vaccine.

Stakeholders in this steering group include experts on human and equine herpesvirus from around the world.

The Animal Health Trust researchers plan to construct up to seven different viruses with attenuating mutations to determine their appropriateness for use in a modified live viral vaccine.

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## Ad Index

AAEP.....	47	Kentucky Performance Products.....	31
ADM .....	1	KindredBio .....	11, 12
Animal Arts.....	60	Merck Animal Health .....	9
AVMA PLIT .....	45	Northeast Association of Equine Practitioners .....	37
Bimeda .....	43	Platinum Performance Inc. ....	Cover 4
Boehringer Ingelheim Stress and Ulcers .....	14-19	Shank's Veterinary Equipment.....	60
Boehringer Ingelheim Reclaiming Vaccinations.....	48-56	SmartPak.....	13
Business Infusions/HVMS .....	21	Soft-Ride.....	33
Cosequin (Nutramax).....	5	Sound .....	Cover 3
Covetrus Synovial Wounds.....	22	Sox for Horses .....	24
Dechra.....	35	Standlee Hay Company .....	27
Disease Du Jour Podcast (brought to you by Merck Animal Health) .....	59	Straight Arrow .....	25
Doc's.....	10	Vet-Ray by Sedecal .....	Cover 2
Equine Diagnostic Solutions.....	24	W.F. Young Inc. Bute-Less .....	7
Franklin-Williams .....	34	W.F. Young Inc. UltraShield .....	29
Hallmarq special advertising section .....	38-41	Zoetis.....	3





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