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Photography



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And the Winner Is ...

EquiManagement is thrilled to have been named a winner in the American Horse Publications Awards! EquiManagement won its division in "Breaking News or Investigative Reporting Single Article" with Dr. Amy Grice's "Effects of the COVID-19 Pandemic on Equine Practice." Production of this article was supported by Merck Animal Health.

When Amy and I were talking about the pandemic in the summer of 2020, we both already knew there were changes underway in the veterinary industry, as there were in every segment of life. What we didn't know was what the changes were and how they were affecting equine veterinarians.

Amy recommended we do a survey, and the first call I made was to Merck to see whether they would help financially support this project. Their answer was quick and affirmative, and Grice was turned loose to gather important information about how veterinarians were coping with the pandemic.

This survey revealed the first look at how the pandemic was affecting our industry. It showed that financially, many practices were doing better than normal, but most vets were feeling the stress. Almost two-thirds of respondents (62.9%) reported "feeling anxious or worried," more than half (56.6%) reported "feeling exhausted" and about half (51.2%) were "feeling overwhelmed." Insomnia was affecting about a third (31.2%), 38.1% reported "feeling sad or depressed" and 43.9% said they were "short-tempered and irritable."

Younger veterinarians (those in the first five years of practice) seemed to suffer from more stress-related issues than vets with more than 20 years of experience. As Grice said in her article, "Recognizing these increased stresses on new practitioners is important for employers as they navigate managing a busy equine practice.

With retention of equine veterinarians already a concern, pressures exacerbated by the pandemic might play a role in continuing this trend."

Grice summed up the survey article by saying, "As equine veterinarians continue to work hard to meet the needs of their clients and patients in this difficult time, it is good to know that most are doing well financially despite their increased stress. Finding new, efficient ways to deliver care and communicate with all stakeholders could help ease some of the workload."

Other AHP Recognition

EquiManagement is also please to share that another article—"How to Embrace and Leverage Growth Mindset," by Dr. Colleen Best—received an honorable mention in the category of "Service to the Consumer Single Article." In the article Best stated, "Growth mindset is incredibly powerful

and can help you release yourself from the fear that comes along with failure."

EquiManagement's Disease Du Jour podcast received an Honorable Mention in the "Publishing Media Equine-Related Podcast" category. The Disease Du Jour podcast, launched in 2019, is supported by Merck Animal Health in 2021.

Cold Feet/Hot Cash

And speaking of winners ... veterinarians can sign up to win a pair of Soft-Ride Ice Boots (value \$445) in our AAEP Convention Cold Feet/Hot Cash Giveaway. We also are giving away a \$250 VISA gift card that can we won by anyone signing up!

There is only one entry per person online (<https://bit.ly/coldfeethotcashcontest>), but if you are attending the AAEP Convention in Nashville, stop by booth #811 and sign up to get a second chance to win!

So don't delay—register today for the Cold Feet/Hot Cash Giveaway! **EM**



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US-EQU-0137-2020-A

Transmission of Equine Herpesvirus

While many equine herpesvirus infections resolve uneventfully, the concern over epidemic outbreaks of EHV-1 equine herpesvirus myeloencephalitis (EHM) has prompted intense biosecurity measures at venues where large numbers of horses congregate. Normally, EHV-1 is transmitted by contact with nasal mucus from infected horses, by sniffing or touching an infected aborted fetus, from placental tissues or passed transplacentally from mare to foal or via embryo transfer techniques. EHV-4 also comes from respiratory secretions. Infection from EHV-3 primarily comes from genital tissues and semen.

A study looked at the likelihood of herpesvirus transmission in the environment from fomites, aerosols, water and feces [Dayaram, A.; Seeber, P.A.; Greenwood, A.D. Environmental

Detection and Potential Transmission of Equine Herpesviruses. *Pathogens* 2021, 10, 423 <https://doi.org/10.3390/pathogens10040423>].

Aerosol transmission can occur from herpes-contaminated airborne respiratory droplets that can travel many feet. While the distance is not yet quantified, the possibility of aerosol transmission between horses should be considered when isolating sick animals. Transmission through the air depends on many viral and environmental factors: temperature, humidity, airflow, virus size and the nature of the fluid containing the droplets.

Fomites likely serve as more important sources of virus transmission, with virus able to remain stable and infectious for as long as seven days on wood, paper and rope. On leather, fabric, wood shavings, wheat straw and polystyrene, it is viable for 48 hours.

On horse hair, the virus might remain viable for as long as 42 days. As people and equipment move around a facility, it is possible for virus to be carried from one area to another on clothing, hands and equipment despite careful separation of horses. This has important considerations for biosecurity practices on a property.

Shedding of herpesvirus is usually considered to pass through nasal secretions or venereal transmission; however, systemic infection, viral replication or swallowing of contaminated nasal material can enable entry of the virus into the intestinal tract and intestinal nervous tissue with excretion in the feces within just a couple of days. (EHV-3 from genital secretions pass through the urine.) Disposal of manure and urine-soaked bedding also has biosecurity implications.

Water is another vector for trans-



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Water is another vector for transmission of herpesvirus as well as other equine viruses, including equine influenza, rotavirus, adenovirus and hepatitis A virus.



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mission of herpesvirus as well as other equine viruses, including influenza, rotavirus, adenovirus and hepatitis A virus. In water, EHV-1 remains relatively stable in temperatures of 39–86 degrees F, especially if there are sediments in the water. Shared water sources have a potential for viral spread. Best practices for prevention include separate water vessels for each individual horse.

Environmental transmission typically applies to EHV-1 and not as much to EHV-4. The take-home message from this study suggested that more biosecurity efforts should be taken in addition to horse separation and isolation; water, feces and fomites must be similarly managed with good biosecurity.

Uterine Infusion of Platelet-Rich Plasma

Dealing with persistent breeding-induced endometritis of a mare can be frustrating when there is no response to antimicrobial therapy, particularly as the breeding season progresses. An Egyptian study from October 2019 to April 2020 compared the use of platelet-rich plasma (PRP) in a fresh or lyo-

philized form on ovarian activity and pregnancy rate [Dawod, A.; Miro, J.; Elbaz, H.T., et al. Effect of Intrauterine Infusion of Equine Fresh Platelet-Rich Plasma (PRP) or Lyophilized PRP (L-GF equina) on Ovarian Activity and Pregnancy Rate in Repeat Breeder Purebred Arabian Mares. *Animals* 2021, 11, 1123. <https://doi.org/10.3390/ani11041123>].

The benefits of PRP are many due to the concentration of growth factors contributing to tissue regeneration along with anti-inflammatory effects. A lyophilized form (L-GF equina) is stabilized and can be cold stored for several months at 35–46 degrees F. It is shown to stimulate proliferation of epithelial cells and fibroblasts. Use of the lyophilized product eliminates the need for repeated blood draws and collection with specialized equipment.

The study worked with 73 mares, aged 5–18 years, all in good body condition (BCS = 5) but with a history of infertility and repeat breeding. Reproductive organs were reported as normal and the uterine lumen did not have fluid accumulation. They were split into



PRP can shorten estrous cycles without affecting follicular diameter, and the effects of PRP result in improved pregnancy rates in difficult-to-breed mares.

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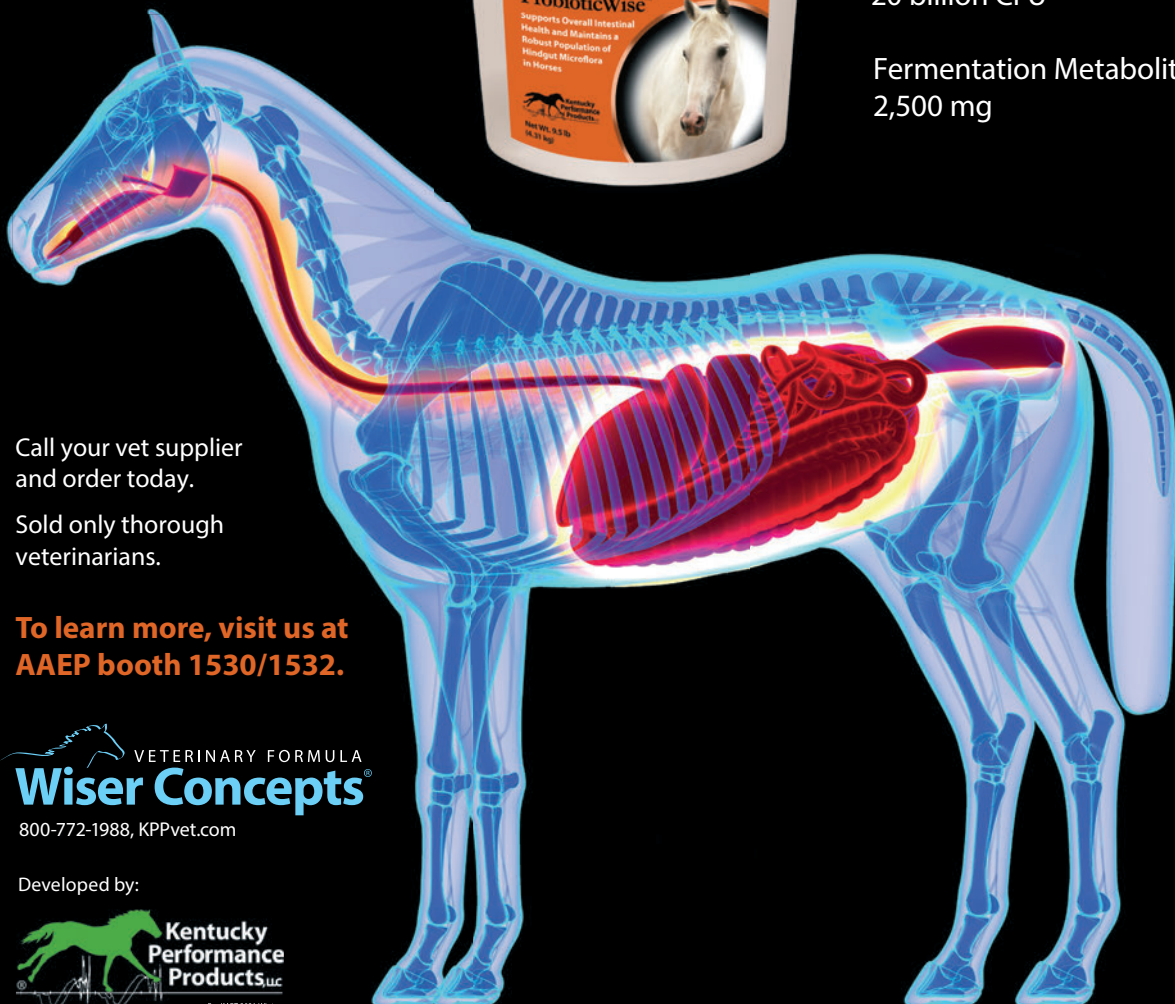
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three groups: a) non-treated control of 32 mares; b) 32 mares treated with 20 ml fresh PRP; c) nine mares treated with 20 ml of lyophilized L-GF equina reconstituted in normal saline. (Only nine mares were used due to limited supplies of lyophilized PRP.) The uteri of treated mares were infused two days after the end of estrus.

Mares were teased following PRP treatment. Follicle size, endometrial thickness and edema were monitored via ultrasound and correlated with behavioral activity associated with estrous signs. The mares were given 2500 IU hCG 12–24 hours prior to breeding once a follicle diameter reached ≥ 40 mm and endometrial edema was grade 2. Ovulation was confirmed 24 hours

after insemination. Ultrasound at 30 days post-insemination looked for an embryo to confirm pregnancy.

Use of L-GF equina shortened the time to estrus to 7.56 days, whereas fresh PRP took 9.62 days and the control group took 21.06 days to estrus. The authors explained why this might be: “The high growth factor content of both PRP and L-GF equina could initiate new follicular development and growth, which secretes high E2 that downregulates the progesterone receptor (PR), activating the oxytocin receptor and the release of premature PGF2alpha from the endometrium, leading to premature regression of the corpus luteum. No differences were seen with follicle diameter.”

Thickness of the endometrium was greater in the fresh PRP-treated group compared to the L-GF equina group, which was also significantly thicker than controls.

The pregnancy rate in the L-GF equina numbered 66.7% and the fresh PRP group numbered 50%, which is significant compared to only 6.25% pregnancy in the control group.

The researchers note that PRP decreased inflammation of the endometrium with a subsequent increase in fertility and conception.

In summary, PRP can shorten estrous cycles without affecting follicular diameter, and the effects of PRP result in improved pregnancy rates in difficult-to-breed mares.



ARND BRONKHORST PHOTOGRAPHY

An Italian study looked at four warmblood horses with colon impactions that were given aggressive enteric therapy of large fluid volumes and subsequently developed large colon volvulus.

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IMPORTANT SAFETY INFORMATION: Avoid skin contact. Always wear protective gloves when administering REGU-MATE®. This product is contraindicated for use in mares with a previous or current history of uterine inflammation. Pregnant women, or women who suspect they are pregnant, should not handle this product. For complete safety information, please read product label.

¹Data on file. Merck Animal Health.

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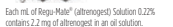
ORAL PROGESTIN
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SOLUTION 0.22% (2.2 mg/mL)

- For suppression of estrus in mares.
- Suppression of estrus allows for a predictable occurrence of estrus following drug withdrawal in mares with ovarian follicles 20 mm or greater.
- Suppression of estrus will facilitate:
- Attainment of regular cyclicity during the transition from winter anestrus to the physiological breeding season.
 - Management of prolonged estrus conditions.
 - Scheduled breeding during the physiological breeding season.

WARNING: DO NOT USE IN HORSES INTENDED FOR HUMAN CONSUMPTION.
Keep this and all medication out of the reach of children.

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

DESCRIPTION
Regu-Mate® (altrenogest) Solution 0.22% contains the active synthetic progestin, altrenogest. The chemical name is 17 α -ethyl-17 β -hydroxyestra-4,9,10-trien-3-one. The CAS Registry Number is 850-52-2. The chemical structure is:



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

ACTIONS
Regu-Mate® (altrenogest) Solution 0.22% produces a progestational effect in mares.

INDICATIONS Regu-Mate® (altrenogest) Solution 0.22% is indicated to suppress estrus in mares. Suppression of estrus allows for a predictable occurrence of estrus following drug withdrawal. This facilitates the attainment of regular cyclicity during the transition from winter anestrus to the physiological breeding season.

Suppression of estrus will also facilitate management of prolonged estrus conditions. Suppression of estrus may be used to facilitate scheduled breeding during the physiological breeding season.

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

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

DOSEAGE AND ADMINISTRATION While wearing protective gloves, remove shipping cap and seal, replace with antistatic plastic dispensing cap. Remove cover from bottle dispensing tip and connect luer lock syringe (without needle). Draw out appropriate volume of Regu-Mate® solution. (Note: Do not remove syringe while bottle is inverted as air may result.) Inject syringe and administer solution orally at the rate of 1 mL per 100 pounds body weight (0.044 mg/kg) once daily for 15 consecutive days. Administer solution directly on the base of the mare's tongue or on the mare's usual grain ration. Replace cover on bottle dispensing tip to prevent leakage. Excessive use of a syringe may cause the syringe to stick; therefore, replace syringe as necessary.

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

WHICH MARES WILL RESPOND TO REGU-MATE® (altrenogest) SOLUTION 0.22%? Extensive clinical trials have demonstrated that estrus will be suppressed in approximately 95% of the mares within three days; however, the post-treatment response depended on the level of ovarian activity when treatment was initiated. Estrus in mares exhibiting regular estrus cycles during the breeding season will be suppressed during treatment; these mares return to estrus four to five days following treatment and continue to cycle normally. Mares in winter anestrus with small follicles continued in anestrus and failed to exhibit normal estrus following withdrawal. Response in mares in the transition phase between winter anestrus and the summer breeding season depended on the degree of follicular activity. Mares with inactive ovaries and small follicles failed to respond with normal cycles post-treatment, whereas a higher proportion of mares with ovarian follicles 20 mm or greater in diameter exhibited normal estrus cycles post-treatment. Regu-Mate® (altrenogest) Solution 0.22% was very effective for suppressing the prolonged estrus behavior frequently observed in mares during the transition period (February, March and April). In addition, a high proportion of these mares responded with regular estrus cycles post-treatment.

SPECIFIC USES FOR REGU-MATE® (altrenogest) SOLUTION 0.22%:

- SUPPRESSION OF ESTRUS IN**
1. Facilitate attainment of regular cycles during the transition period from winter anestrus to the physiological breeding season. To facilitate attainment of regular cycles during the transition phase, mares should be examined to determine the degree of ovarian activity. Estrus in mares with inactive ovaries (no follicles greater than 20 mm in diameter) will be suppressed but these mares may not begin regular estrus cycles following treatment. However, mares with active ovaries (follicles greater than 20 mm in diameter) frequently respond with regular post-treatment estrus cycles.
 2. Facilitate management of the mare exhibiting prolonged estrus during the transition period. Estrus will be suppressed in mares exhibiting prolonged behavioral estrus either early or late during the transition period. Again, the post-treatment response depends on the level of ovarian activity. The mare with greater ovarian activity initiate regular cycles and conceive sooner than the inactive mares. Regu-Mate® (altrenogest) Solution 0.22% may be administered early in the transition period to suppress estrus in mares with inactive ovaries to aid in the management of these mares or to mares later in the transition period with active ovaries to prepare and schedule the mare for breeding.
 3. Permit scheduled breeding of mares during the physiological breeding season. To permit scheduled breeding, mares which are regularly cycling or which have active ovarian function should be given Regu-

Mate® (altrenogest) Solution 0.22% daily for 15 consecutive days beginning 20 days before the date of the planned estrus. Ovulation will occur 5 to 7 days following the onset of estrus as expected for non-treated mares. Breeding should follow usual procedures for mares in estrus. Mares may be registered and scheduled either individually or in groups.

ADDITIONAL INFORMATION
A 5-year well controlled reproductive safety study was conducted in 27 pregnant mares, and compared with 24 untreated control mares. Treated mares received 2 mL Regu-Mate® (altrenogest) Solution 0.22% 700 to body weight (2 x dosage recommended for estrus suppression) from day 20 to day 325 of gestation. This study provided the following data:

1. In 100 offspring (all ages) of treated mares, clinical size was increased.
2. 71% offspring from treated mares had shorter interval from Feb. 1 to first ovulation than fillets from their untreated mare counterparts.
3. There were no significant differences in reproductive performance between treated and untreated animals (mares & their respective offspring) measuring the following parameters:
 - Interval from Feb. 1 to first ovulation, in mares only
 - mean interovulatory interval from first to second cycle and second to third cycle, mares only
 - follicle size, mares only
 - at 50 days gestation, pregnancy rate in treated mares was 88.2% (9/10) and untreated mares was 100% (4/4).
4. At 100 days gestation, 100% of treated mares were pregnant (98.7%) and 4/4 untreated mares were pregnant (100%).
5. calf offspring of treated and control mares reached puberty at approximately the same age (62 & 64 weeks respectively).
6. stallion offspring from treated and control mares showed no differences in seminal volume, spermatozoal concentration, spermatozoal motility, and total sperm per ejaculate.
7. stallion offspring from treated and control mares showed no differences in sexual behavior.
8. testicular characteristics (scrotal width, testis weight, parenchymal weight, epididymal weight and height, testicular height, width & length) were the same between stallion offspring of treated and control mares.

REFERENCES Shoemaker, C.F., E.L. Squires, and R.K. Graham, 1989.
Safety of Altrenogest in Pregnant Mares and on Health and Development of Offspring. Eq. Vet. Sci., 9(2), No. 2, 62-72.
Squires, E.L., R.K. Shideler, and A.D. McKinnon, 1989. Reproductive Performance of Offspring from Mares Administered Altrenogest During Gestation. Eq. Vet. Sci., 9(2), No. 2, 72-76.

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

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

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

Effects of Overexposure
There has been no human use of this specific product. The information contained in this section is extrapolated from data available on other products of the same pharmacological class that have been used in humans. Effects anticipated are due to the progestational activity of altrenogest.
Acute effects after a single exposure are possible; however, continued daily exposure has the potential for more untoward effects such as disruption of the menstrual cycle, uterine or abdominal cramping, increased or decreased uterine bleeding, prolongation of pregnancy and headaches. The oil base may also cause complications if swallowed.

1. In addition, the list of people who should not handle this product (see below) is based upon the known effects of progestins used in humans on a chronic basis.
2. **PEOPLE WHO SHOULD NOT HANDLE THIS PRODUCT** should be avoided by the skin. Skin contact must be avoided during the use of oral contraceptives or other estrogen-containing products.
3. Anyone with thrombophlebitis or thromboembolic disorders or with a history of these events.
4. Anyone with cerebral-vascular or coronary-artery disease.
5. Women with known or suspected cardiac of the breast.
6. Women with known or suspected estrogen-dependent neoplasia.
7. People with benign or malignant tumors which developed during the use of oral contraceptives or other estrogen-containing products.
8. Anyone with liver dysfunction or disease.

Accidental Exposure
Altrenogest is readily absorbed from contact with the skin. In addition, this oil based product can penetrate porous gloves. Altrenogest should not penetrate latex rubber or impervious gloves; however, if there is leakage (i.e., pinholes, spillage, etc.), the contaminated area covered by such occlusive materials may have increased absorption. The following measures are recommended in case of accidental exposure.
Skin Exposure: Wash immediately with soap and water.
Eye Exposure: Immediately flush with plenty of water for 15 minutes. Get medical attention.
If Swallowed: Do not induce vomiting. Regu-Mate® (altrenogest) Solution 0.22% contains an oil. Call a physician. Vomiting should be supervised by a physician because of possible pulmonary damage as a result of the oil base. If possible, bring the container and labeling to the physician.

Store at or below 25°C (77°F).
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KEEPING UP (cont.)

Enteral Fluids for Intestinal Impaction and the Potential for Volvulus

Besides administration of intravenous fluid therapy to address an intestinal impaction, it is common for horses with some gut motility to receive enteral fluids via nasogastric tube. Volumes of 10 liters of water given orally for a 500-kg horse has been reported to be safe and effective for colon hydration.

An Italian study looked at four horses diagnosed with a colon impaction between 2012–2019, and all four developed a large colon volvulus following aggressive enteral therapy of large fluid volumes [Giusto, G.; Cerullo, A.; Gandini, M. Gastric and Large Colon Impactions Combined with Aggressive Enteral Fluid Therapy May Predispose to Large Colon Volvulus: 4 Cases. *Journal of Equine Veterinary Science* 2021, vol. 102; <https://doi.org/10.1016/j.jevs.2021.103617>].

The horses—all warmbloods—were referred to the veterinary teaching hospital with mild to moderate colic pain attributed to large colon impaction based on rectal examination. The referring veterinarians treated the horses with IV fluid therapy, spasmolytic medications, analgesics and nasogastric administration of 8-10 liters of water (20 ml/kg) via gravity flow. Worsening of pain and heart rate immediately following enteral fluid therapy prompted their referral to the hospital.

Unrelenting and unresponsive pain dictated the decision to take the horses to surgery. At surgery, all horses were identified with a large colon torsion and a concomitant gastric impaction, which was confirmed with endoscopy following recovery from surgical correction of the large colon volvulus.

Large volumes of fluid can distend the stomach wall, and the authors report that not only does gastric dis-

tention elicit a pain response, but “it may be associated with an increase in intra-abdominal pressure that could predispose to large colon dislocation or volvulus.”

Gastric impaction itself might predispose to large colon volvulus through alterations in intra-abdominal pressure, or displacement of the colon compresses the pylorus to block passage of stomach contents into the small intestine. In these four cases, the authors suggested that enteral administration of large fluid volumes in the presence of a pre-existing mild or moderate gastric impaction might have created conditions to result in colon torsion. They noted that they “cannot say this is a causal association rather than coincidence.”

The authors recommended not only rectal examination but also, when possible, to perform transabdominal ultrasound to look for gastric distention before administering large volume enteral fluid therapy. Even five liters of fluid has been shown to increase intra-abdominal pressure. They recommend use of smaller volumes of water combined with DSS surfactant (dioctyl sodium sulfosuccinate) to help promote hydration of gastric and intestinal contents. Given in small volumes twice daily, this can help resolve impaction colic through hydration and improvement in motility.

Based on their experience with these four cases, the authors have since adopted a new approach to treating impactions: combining parenteral administration of crystalloids with continuous enteral administration of fluids through a nasogastric tube connected to fluid bags. This prevents sudden distention of the gastric wall as is incurred with large boluses of fluid. An alternative suggestion is to provide gravity flow of small volumes of water (4-10 ml/kg) and DSS in frequent doses. **EM**

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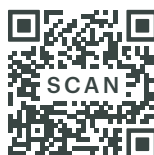


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The Perils of Discounting

Veterinarians give discounts to clients for all kinds of reasons. Maybe one of their favorite patients that is owned by a 4-H kid from a family of limited means has sustained an injury that will be expensive to treat. Or perhaps, despite best efforts, a case has a bad outcome. Sometimes a known—though rare—complication occurs, like a fatal colitis after administration of an antibiotic. Or a trainer will deliver a whole barn of client horses as new patients, if the vet offers a reduction in fees for work on his/her personal horses.

Whatever the basis for reducing fees, discounting is generally a bad idea for the health of the business. Discounts come directly from profit and erode a practice's earnings and value.

When a veterinarian reduces fees, he/she is signaling that the value of the service provided is over-priced at the normal rate.

Discounting decreases the perceived value of the service, regardless of the reason. Even worse, it creates an expectation of future discounts, both with that particular client and with all the other clients in the local equine community who hear about the doctor's generosity.

Recognizing that veterinarians are kind, generous animal lovers, one solution for practice owners is to budget a certain amount each year for each doctor to use—a “discount account” that can be used all at once on one case or in small

increments. This can support a veterinarian's emotional health by recognizing the need to make a difference for a special case from time to time.

Discounting can really complicate business systems. Imagine a large breeding farm that insists on discounted service prices, or they'll go to another practice for veterinary work. When a discount is given to one farm, but not to another, the practice is suddenly invoic-

If a certain group of services is recommended for a case, and the client hesitates due to price—then a discount is offered—this lowers the client's confidence and trust. Instead, offering alternatives that contain fewer diagnostics or components of treatment is the best approach.

A client's due diligence will often include asking questions, stating objections, and having a desire to get the best outcome for the lowest price. By staying calm and explaining the “why” of recommendations, the client can make the choice that makes the most sense for his or her personal circumstances.

When a veterinarian gives reactionary discounts to clients who bully him or her by complaining about prices, services or skill, that veterinarian is doing a huge disservice to those loyal clients who

are grateful for that veterinarian's quality of care. It can be hard to have those difficult conversations with unpleasant people, and sometimes it seems easier just to give in. But remember: “You train what you tolerate.”

Setting fair prices that allow the practice to pay living wages to staff and doctors—and accumulate value for the owners—is the first step. Providing a consistent value to clients that supports the practice fees must follow. Discounting need not be part of the equation. **EM**



ISTOCK/URBANCOW

ing under different price structures for the same level of service.

Imagine if another farm's manager hears of the discount. Chances are that manager will not only feel disgruntled, he or she will likely want the practice to give an identical discount or the farm will switch providers. A series of different computer software codes for the same service at different prices for different clients can create internal chaos and administrative nightmares, especially in practices with multiple veterinarians.

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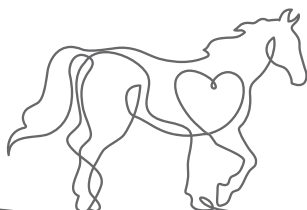
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HATE TALKING ABOUT MONEY? YOU ARE NOT ALONE!

Insights from a CareCredit survey on veterinary client payment can help veterinarians get paid on time and in full.

By Amy L. Grice, VMD, MBA

CareCredit, which offers a financing solution to veterinary clients, commissioned a survey to better understand how equine veterinary professionals balance their love of the profession (and horses) with the business side of running their practices. The survey, fielded in December 2020, resulted in 100 surveys used in analyzing the data. Of those responses, 46 were from practicing veterinarians and 54 were from office managers, practice managers, office administrators or veterinary technicians. 74% of respondents were from equine-only practices. Of those, 2% offered only specialty services, 42% offered general and specialty services, and 30% provided general practice services. The remaining respondents (26%) were in mixed practice. Of the horses cared for by the respondents' practices, 70% were used for pleasure. The respondents' gender was 56% female and 42% male, with an age range of 24 to 82 years.

MOST VETS SURVEYED DON'T LIKE FINANCIAL CONVERSATIONS

When asked “*Who in your practice is primarily responsible for FINANCIAL CONVERSATIONS with clients and for COLLECTING receivables?*”, it became clear that most equine veterinarians prefer not to talk about money with their clients. If that sounds like you, you now know you are not alone in your avoidance of financial conversations.

The survey showed that 90% of the veterinarians were not involved in the financial conversations with clients, and 95% of the veterinarians were not involved in collections.

WHY PAYMENT CONVERSATIONS ARE DIFFICULT

An open-ended question asking “*What makes having payment conversations with clients difficult?*” yielded an interesting difference between veterinarian and staff responses. Doctors were much more likely to express that talking about finances was difficult, stressful or complicated compared to staff members, with 75% of veterinarians expressing negative feelings versus only 40% of lay staff.

The three core issues that arose for veterinarian respondents regarding financial conversations were:

1. the desire to focus on patient care rather than money;
2. the perception that they lack information or details

about financial arrangements or policies; and

3. the personal discomfort with talking about earning money for their services.

Horse owners value the services that veterinarians provide. Veterinarians do themselves a disservice when they feel bad about earning a living taking good care of horses, or they don't charge appropriately.

MOST PRACTICES HAVE CLIENT FINANCIAL POLICIES

Respondents were asked “Does your practice have formal written financial policies you provide to clients regarding your payment expectations? How do you currently communicate payment options to your clients?” The study found 78% of practices had policies, and they communicated their expectations and payment options to clients. A new client packet that included these policies was the most prevalent way these expectations were disseminated. But that result also means that nearly one-quarter of respondents did not have written financial policies for clients.

Following or enforcing the policy for clients concerning bill pay is a common downfall of equine veterinary practices. Often new clients will more readily adhere to these policies than “legacy” clients who

have been trained by their veterinarians to expect an invoice in the mail once a month and to have 30 or more days to pay that invoice.

WHY PRACTICES WAIVE FEES

When queried “Why or when do you reduce or waive fees for services?”, the most common reasons (48%) for discounting fees were client hardship, inability to pay the full amount of the invoice, or client expectation that the charges would be lower.

services can reduce the practice's profit, which can lower practice value while simultaneously training clients to expect lower fees.

When clients have overdue accounts, the survey respondents stated that they send or text reminders, utilize phone calls, mail invoices with billing options or collect before a new service is provided or at the time of the next service. They also might refuse further service, send the bill to collections, reduce fees or—after a period of time—write off the

It is essential that practice owners follow their own policies or the system will not be viable. Staff members doing their best to collect fees from clients according to the practice “rules” might lose their motivation if the practice owners do not back them up or ignore the policies for their favorite clients.

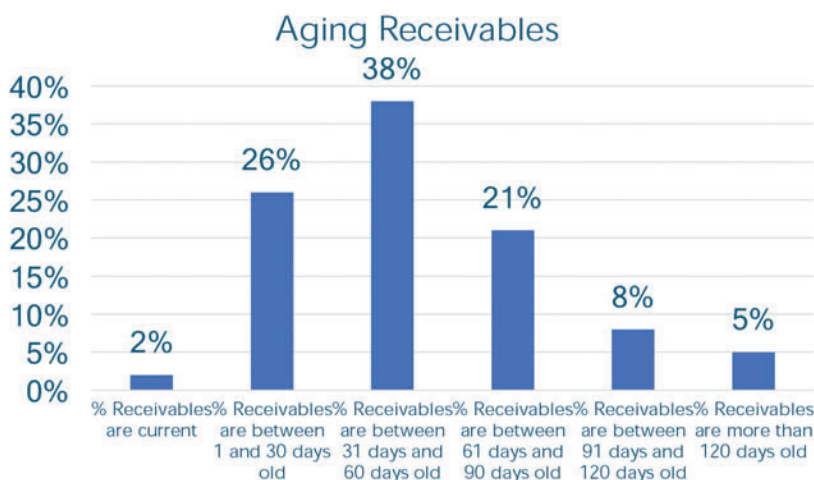
WHEN CLIENTS CAN'T PAY

When asked “How often do you reduce or waive fees for services due to a perceived/actual ability of a client to pay?”, 61% of respondents replied that they will reduce or waive fees mostly on an ad hoc basis. This finding shows that equine veterinarians put the needs of clients before their own financial needs.

Equine veterinarians can often find themselves conflicted between the medical/surgical care a horse needs and a client's willingness or ability to pay. This survey asked, in that circumstance, “What do you do, and why?” The respondents indicated three core ways they deal with an inability to pay for care.

1. They provide the care anyway and leave the financial aspect to someone else in the practice. In a solo practice, this often means performing the care for free.

2. Veterinarians seek to communicate well, give options, modify payment



CareCredit Equine Veterinary Practice Survey, 2020

About 28% said they reduced fees to ensure some payment, and 15% stated that they charged less because of a relationship with the client or a one-time need. Other respondents gave discounts when a client was willing to pay in cash; to save the horse's life; when there was a bundle with other services; when the patient died; or to increase goodwill with a client.

From a business management standpoint, it is important to note that discounting

amount.

Shifting to a mindset and business strategy focused on getting paid at the time of service and building healthy financial relationships with clients can alleviate this predicament. A good first step is establishing clear expectations and having a policy that clearly states that clients will pay at time of service. Having credit cards on file for every client can make payment efficient and convenient, especially for absentee owners.

plans, extend credit, suggest financing options such as the CareCredit credit card, or work out a payment plan with the practice.

3. When these options are insufficient, doctors might be forced to walk away from a need or make a difficult choice for euthanasia.

ENHANCING FINANCIAL RELATIONSHIPS

Respondents were asked “If you could do one thing to create a great financial relationship with your client, what would it be?” The respondents were aligned in stating that providing payment options and eliminating collection issues were the top two ways to create a great financial relationship with the client. Veterinarians’ third-most-chosen-way was open communication, and staffs’ third-most-common choice was having well-written, workable financial policies.

The good news is that 78% of respondents said clients adhere to their financial policies. However, that leaves a substantial number of horse owners who are not following those financial policies.

HOW AND WHEN CLIENTS PAY

The survey results showed that 75% of respondents are paid with a credit card (49%) or by check (26%).

The survey also revealed that 72% of respondents had aging accounts receivable that were greater than 30 days. While generally those practices that send monthly invoices are paid within 30-60 days, 34% of accounts in this study were not paid by 60 days.

Having financial policies requiring full payment at the time of service can dramatically improve cash flow and reduce accounts receivable. In my experience, accounts receivable over 90 days are

credit card on file, pre-authorize payment, tighten payment policies, communicate policies early and often, reduce time to invoice, and offer a discount for cash payment.

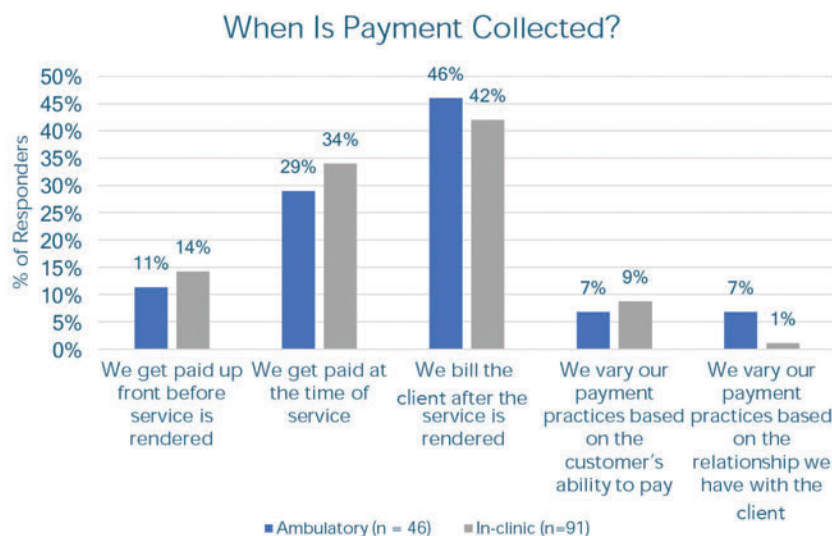
TAKE-HOME MESSAGE

Getting paid in full at the time of service is beneficial for equine veterinarians, and a culture shift that prioritizes this mindset is within reach.

This survey elucidates the discomfort and difficulty felt

full at the time of service. For example, with the CareCredit credit card, veterinarians can get paid immediately, and clients can use the card repeatedly for their horses’ care as a convenient way to pay.

Steps veterinarians can take to make practices more profitable and their lives less stressful include creating clear policies that all team members (including practice owners) follow; training staff to be more comfortable with financial conversations; and client communication that increases adherence to financial policies.



CareCredit Equine Veterinary Practice Survey, 2020

often uncollectible.

For ambulatory practitioner payment, the respondents said the most effective solutions included having a credit card on file, providing pre-payment plans, calling or texting about payment policy and estimated costs prior to a visit, providing a cash discount, and pre-authorizing credit cards before the visit. For payment of in-hospital services, respondents offered the following solutions: require payment up front, put a

by veterinarians over fee collection. 75% of survey veterinarians found it very difficult to talk about money. Vets noted that they just wanted to concentrate on patient care; they didn’t know the details of what could be offered financially; or they just were personally uncomfortable talking about money, especially in relation to services they were providing.

Equine veterinarians properly communicating payment options can help clients pay in

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Researchers and veterinarians are still working to better understand the equine microbiome.

Understanding and Managing the Equine Intestinal Microbiome

Let's take a close-up look at what's churning and turning in a horse's fermentation vat and take away some key concepts about the microbiome.

By Stacey Oke, DVM, MSc

If you talk to a sports medicine clinician, podiatrist or lameness specialist, he or she might tell you “No hoof, no horse.” But an equine nutritionist might say that the intestinal microbiome is perhaps the most important part of the horse's body and should be considered its own organ.

“The intestinal microbiome acts as another organ that is not just essential but actually crucial for horse health,” said Tania Cubitt, PhD, a nutritionist from Performance Horse Nutrition.

Cubitt is one of many nutritionists who believes that gut trumps hoof. She said, “While the hoof is anatomically critical to the horse, it can be either destroyed or improved by what you feed the horse. We can even say, ‘no gut, no hoof.’”

An estimated one quadrillion bacteria reside in and contribute to the microscopic community within the equine large intestine. Scientists exploring the microbiome acknowledge that despite the explosion of research in this field

over the past several years, we really have only skimmed the surface of what's in the voluminous vat of microbes that fill the horse's cecum and colon. In fact, trying to study the equine intestinal microbiome is like trying to see what's happening at a party through the crack underneath a door.

In this article, we'll explore the role and composition of the intestinal microbiome, the causes of dysbiosis, and what we need to do to keep it happy for optimal horse health.



Duties of the Microbiome

Harvesting nutrients is one of the most obvious roles that microbes play in the equine gastrointestinal tract (GIT).

As we know, nonstructural carbohydrates are digested in the proximal GIT and nutrients absorbed in the small intestine. The large intestine ferments structural carbohydrates (cell walls of plants).

Fermentation of these fibers produces volatile fatty acids (VFAs) such as butyrate, acetate and propionate, which are the most important sources of energy for horses.

The microbiome performs an array of additional yet equally important roles that many of us might not consider. For example, fiber fermentation produces heat, which helps horses in colder climates thermoregulate. In addition, the microbiome:

- resists colonization of pathogens in the GIT;
- detoxifies and removes harmful compounds in the host, including free radicals;
- is a key player in immune system function; and
- influences the animal's metabolism/ affects metabolic functions.

KEY CONCEPT: *The term "microbiota" refers to the microorganisms in a particular environment. This is not to be used synonymously with "microbiome," which refers to all the genetic material of those microorganisms as well as their interactions with the environment.*

Knock, Knock. Who's There?

Although most of the microbiome primarily remains shrouded in mystery, like dark space and black holes, some progress has been made identifying key players in the microbiome. In addition to bacteria, which are the most widely studied, other microorganisms found in the depths of the intestinal tract include viruses (including bacteriophages), fungi/yeast, protozoa, parasites and archaea (*see sidebar, page 30*).

As mentioned earlier, experts believe horses have about 10^{15} bacteria in their GITs, the bulk of which are found in the cecum and colon. To make this a number we can all appreciate, one quadrillion is equivalent to a 1 km x 1 km x 1.5 km stack of standard Sour Patch Kids, which one Sour Patch mathematician (waitbutwhy.com/2013/10/what-does-quadrillion-sour-patch-kids.html) assures us takes up a sizeable portion of

downtown Manhattan.

Restrictions associated with physically reaching all aspects of the cecum and large intestine to collect samples—as well as limitations analyzing the samples—leave the bulk of researchers looking only at the bacterial composition of feces. Based on those analyses, study after study prints pretty, multi-colored images showing the relative abundance of the main phyla, families and genera of bacteria found in the feces of horses in sickness and health.

Core Microbiome. In apparently normal, healthy horses, studies show that the most common bacteria belong to the phylum *Firmicutes*. The second- and third-most-common phyla are typically thought to be *Bacteroidetes* and *Verrucomicrobia*. The ranking of these bacterial populations does, however, vary depending on which study you read. For example, Zomer et al. (2021) found that *Bacteroidetes* was the largest phylum (50.1%) followed by *Firmicutes* (28.4%).

"Results will vary according to the methods used in the study. One study could find a high abundance of *Verrucomicrobia*, but if you repeat the experiment using a different protocol, you may find more *Bacteroidetes*," noted Marcio Costa, DVM, PhD, professeur adjoint, Département de Biomédecine Vétérinaire, Université de Montréal.

Other important players in the equine intestinal microbiome environment include *Spirochaetes*, *Proteobacteria* and *Fibrobacteres*.

The exact population of the intestinal microbiome, Costa said, will vary depending on the horse's age, geographic location, diet and type of activity (e.g., racing, broodmare).

Don't worry if these phyla don't ring any bells from your first-year bacteriology classes. Table 1 provides some examples of bacteria found in the intestinal microbiome that you might recognize. When perusing the table, Costa advised not to try to classify them as "good" or "bad."

He said, "I would avoid the term

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| PHYLUM | CLASS | FAMILY | GENUS | FUNCTION |
|-----------------|---------------------|---------------------|-----------------|---|
| Firmicutes | Clostridia | Clostridiaceae | Clostridium | Cellulytic, fibrolytic |
| | | Lachnospiraceae | Butyrivibrio | Cellulytic, fibrolytic produce butyrate, known for its role in protecting colonocytes |
| | | Ruminococcaceae | Ruminococcus | Cellulytic/fibrolytic |
| | Bacilli | Bacillaceae | Staphylococcus | |
| | | Lactobacillaceae | Lactobacillus | L-lactate producer |
| Bacteroidetes | Bacteroidia | Bacteroidaceae | Bacteroides | Fiber fermentation |
| Verrucomicrobia | Verrucomibromiae | Akkermansiaceae | Akkermansia | Produces VFAs |
| Proteobacteria | Gammaproteobacteria | Succinivibrionaceae | Ruminobacter | Amylolytic |
| Fibrobacteria | Fibrobacteres | Fibrocateraceae | Fibrobacter | Hydrolyzing plant cellulose |
| Actinobacteria | Actinobacteria | Bifidobacteracea | Bifidobacterium | Carbohydrate-degrading activities |
| Spirochaetes | Spirchaetia | Streptococcaceae | Streptococcus | L-lactate producer |
| | | Lactobacillaceae | Lactobacillus | L-lactate producer |
| | | Veillonellaceae | Veillonella | Lactate-utilizing bacteria |

Table 1. Common bacteria found in the equine intestinal microbiome and their proposed associated functions

‘healthy bacteria’ because we are not sure yet what is the best microbiota. We hypothesize the ‘best’ would be the microbiota selected in horses at natural conditions (pasture) that has greater diversity.”

Costa also said, “The rare bacteria are also very important and need to be considered. Normally they interact in a balance in which the rare bacteria (that we don’t talk about very much) produce metabolites that can be used by other bacteria. It is a very complex ecosystem.”

Unique Fingerprint. One reason for the disparity in which bacteria occur most commonly in the microbiome is that each horse’s microbiome is unique—like a fingerprint.

We also need to remember that many microbiome studies use client-owned horses or animals donated for research purposes. Those horses come from different management conditions. They are fed different diets and are euthanized for different reasons (e.g., age, osteoar-

thritis, behavior or neurologic problems, other diseases). As a result, these might not in fact be “healthy” GITs and microbiomes.

KEY CONCEPT: Diversity, richness and evenness are all assessed when evaluating the individual components of the microbiome. "Richness" refers to the total number of taxa (genera, families, phyla), and "evenness" describes the prevalence of each population within a community. "Diversity" is a measure of how equal a microbial community is. The diversity calculation takes into consideration both richness and evenness. We want to have a rich, diverse microbiome.

Stress: The Underlying Cause of Dysbiosis

Multiple factors can affect the stability of the intestinal microbiome. Ultimately, one can boil down the underlying cause of most cases of dysbiosis to one thing: stress.

KEY CONCEPT: "Dysbiosis" refers to a profound shift of the normal composition and usually a decrease in diversity of the intestinal microbiota.

Cubitt said we should consider the life of an undomesticated horse, consuming a fiber-based diet composed of a large variety of different forages. “Wild horses nibble for 12-18 hours a day, moving almost constantly in a herd,” described Cubitt. “They eat from the ground with their heads down. Not only does the head-down position facilitate drainage from the respiratory tract, this body position also increases chewing time.”

She added, “Even in the most beautiful stall with heat lamps and deep bedding, the modern horse is alone and frustrated. They have a hay net, and their feed bucket is at chest height. In between training and competition, these horses have limited mobility. They are frustrated by the confinement and frequently-fed diets high in cereal grains that are rapidly ingested.”



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

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Altren® (altrenogest)

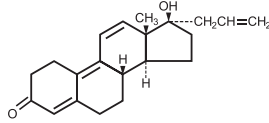
SOLUTION 0.22% (2.2 mg/mL)

CAUTION:

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

DESCRIPTION:

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



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

ACTIONS:

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

INDICATIONS:

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

CONTRAINDICATIONS:

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

PRECAUTIONS:

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

DOSAGE AND DIRECTIONS:

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

DOSAGE CHART:

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

WHICH MARES WILL RESPOND TO ALTREN® (altrenogest) SOLUTION 0.22%?

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

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

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

SUPPRESSION OF ESTRUS TO:

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

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

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

ADDITIONAL INFORMATION:

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

1. In filly offspring (all ages) of treated mares, clitoral size was increased.
2. Filly offspring from treated mares had shorter interval from Feb. 1 to first ovulation than fillies from their untreated mare counterparts.
3. There were no significant differences in reproductive performance between treated and untreated animals (mares & their respective offspring) measuring the following parameters:

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

REFERENCES:

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

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

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

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

WARNING:

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

HUMAN WARNINGS:

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

INFORMATION FOR HANDLERS:

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

Effects of Overexposure

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

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

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

PEOPLE WHO SHOULD NOT HANDLE THIS PRODUCT:

1. Women who are or suspect they are pregnant.
2. Anyone with thrombophlebitis or thromboembolic disorders or with a history of these events.
3. Anyone with cerebral-vascular or coronary-artery disease.
4. Women with known or suspected carcinoma of the breast.
5. People with known or suspected estrogen-dependent neoplasia.
6. Women with undiagnosed vaginal bleeding.
7. People with benign or malignant tumors which developed during the use of oral contraceptives or other estrogen-containing products.
8. Anyone with liver dysfunction or disease.

Accidental Exposure

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

Skin Exposure: Wash immediately with soap and water.

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

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

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

HOW SUPPLIED:

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

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

Approved by FDA under ANADA # 200-620



07/2021

Public Enemy #1: Diet-Related Dysbiosis

While horses evolved on forage-based diets, modern equids often have starch and fat included, often as “staples,” to meet energy demands.

Costa said, “Addition of readily fermentable carbohydrates increases lactic acid-producing bacteria and decreases overall bacterial diversity. In turn, decreased diversity makes horses predisposed to pathogens.”

According to an article published by Garber et al. (2020), multiple studies reported the detrimental effects of grains:

- Inclusion of grains rich in starch reduces microbial diversity, which makes the microbiome less stable, leading to dysbiosis.
 - Hay-based diets degraded at a slower rate than grains, promoting microbial diversity and stability. Diets comprised of only forage have fewer lactic acid-producing bacteria.
 - Increases in *Clostridiaceae* family members have been observed after feeding a combination of forage and concentrates due to an increase in *Lactobacillus ruminis*. Those bacteria were absent from the feces of horses fed only forage.
 - The fibrolytic bacterium *Fibrobacter* in the *Ruminococcaceae* family were decreased in horses fed concentrate-supplemented diets. Those same horses, however, had increases in the *Lachnospiracaceae* family. *Lachnospiracaceae* bacteria are major VFA producers and “core” microbes in the large intestine. They ferment lactate to produce acetate and propionate. The *Lachnospiracaceae* appear to increase in response to an increase in lactic acid-producing bacteria, such as *Streptococci*. Lactic acid is produced by fermenting starch that is not digested in the small intestine.
- “Starch escapes small intestinal digestion after feeding horses >1 g starch/kg body weight per meal,” Costa

explained, referring to information provided in his 2018 article co-authored with Scott Weese, DVM, DACVIM, DVSc Guelph. “If lactic acid is not neutralized, then the pH of the large intestine will drop, which has major consequences as many of the fibrolytic bacteria are acid intolerant and won’t proliferate in an acidic environment.”

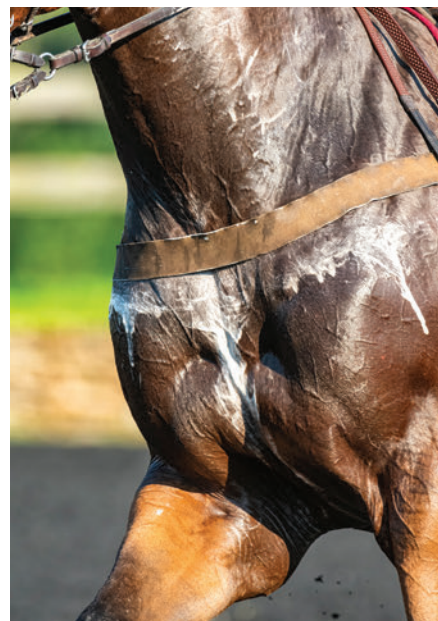
Other Causes of Stress and Dysbiosis

Another “stress” many of us might not think of is domestication. Indeed, Kauter et al. (2019) said that compared to non-domesticated or wild horses, domesticated horses have reduced fecal bacterial diversity. They wrote, “The overall diversity of the core bacterial community of domesticated horses seems to be surprisingly low, a fact that was discussed as a possible reason or the sensitivity of horses to GIT diseases.”

In addition to diet and domestication, other prime causes of stress—and therefore dysbiosis—are varied yet vast, and include some of the following:

- Age and pregnancy;
- Physical: pain, intense exercise;
- Emotional: trailering, competition, mixing herds/conspecifics;
- Heat, weather/season;
- Changes in feed or exercise level, including withholding feed or water prior to competition;
- Drug administration: not just anti-microbials but also anthelmintics, omeprazole and others;
- Infectious agents (mycotoxins in pasture/hay/grain, gastrointestinal pathogens);
- Metabolic conditions;
- Soil accumulation that irritates the gut;
- Obesity and “keeper status” (easy, medium, hard); and more.

“Even changing the time horses are



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A prime cause of stress and dysbiosis is intense exercise.

fed can cause stress,” Cubitt emphasized. “Look at how horses vocalize, paw and



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Pioneering the Intestinal Microbiome

Colonization of the foal's intestinal microbiome begins immediately after birth. This inaugural population of microbes is transient and rapidly changes in response to environment and diet.

The foal's intestinal microbiome likely begins its development during the fetal period under the control of circulating microbial metabolites (Husso, et al. 2020). During parturition, microbial colonization occurs, and the intestinal microbiota undergoes rapid development, changing frequently in the first days, weeks and months of life.

The microbiome of foals is, compared to adults, highly diverse and rich. Early exposure to a diverse array of microbes in the environment tailors the foal's intestinal microbiome. A foal's diet changes drastically from colostrum to milk, followed closely by fiber, some carbohydrates, as well as feces (foals frequently partake in coprophagy). Surprisingly, studies show that the foal's microbiome rapidly stabilizes between Days 20 and 50 postpartum. The microbiome becomes dominated by fiber fermenting species, and beyond Day 50, no significant changes in species abundance occur.

"Relative stability of the gut microbiota was reached within 50 days post-partum, and weaning did not have a major impact on the microbial composition," wrote Lindenberg, et al. (2019).—*Dr. Stacey Oke*

pace if an owner is even a minute late bringing their food!"

Effect on a Horse's Body of a Diseased Microbiome

Once the microbiome becomes disturbed, what are the consequences? Colitis, laminitis, colic, behavior and appetite changes, and even metabolic disturbances.

"Leaky gut syndrome explains some of these phenomena," said Cubitt.

Recall that only one layer of cells—enterocytes—form the barrier between the lumen of the intestine and the blood stream, which is a direct flow to the horse's entire body. Tight junctions between individual enterocytes together with a mucous layer form a protective barrier, restricting bacteria and other microorganisms and molecules from entering the blood. When inflamed, the tight junctions breakdown, the mucous layer thins out, and even the enterocytes

themselves break down, which can result in ulcers. This results in systemic inflammation, malabsorption, reduced immune function and decreased diversity and health of the intestinal microbiome.

This "leaky gut" also affects behavior, as there is a direct connection between the brain and the GIT called the gut-brain-microbiome axis. Horses with leaky gut reportedly have snarky attitudes, can become girthy (the large intestine lies under the girth area), develop diarrhea, have finicky appetites, resent grooming and can suffer recurrent ulcers.

Repairing the enterocytes and re-establishing the tight junctions requires a great deal of energy, especially glucose. Because of the sheer size of the intestinal lining, a large amount of glucose must be diverted to the intestines and away from other body processes. This glucose hijacking might contribute to

altered insulin metabolism and can lead to insulin resistance.

While this leaky gut theory looks good on paper, experts in the field point out that whether dysbiosis causes disease or disease causes dysbiosis remains unclear ... a classic chicken and egg situation.

In Cubitt's opinion, it really could be either.

"There is a myriad of different causes for GIT disease—colic, colitis, hindgut acidosis, etc., including random external factors," said Cubitt. "But I think disruptions to the microbiome can also precede these disorders. In my mind the connections between the environment, food, disease, immunity and the microbiome look like a spider web, and everything is interconnected so intricately. It is impossible to tease it all apart and say with any certainty that A causes B and C causes D, etc."

Optimizing the Microbiome: Return to the Wild

"To maintain healthy microbiomes, what we want to do is 'return to the wild' when feeding horses and really think about decreasing stress," advised Cubitt. "What we really want to do is feed the microbiome rather than just the horse."

First, increase the number of meals per day to greater than two. Ideally, Cubitt recommended encouraging owners to feed six or more meals a day.

As this might prove impossible for many owners, a feasible alternative might involve decreasing the rate of intake.

"Adding chopped forage is a way to slow down the rate of intake of grain," advised Cubitt.

Wild horses do consume a large variety of forages, but if a domesticated horse is not used to such variety, owners should minimize abrupt changes in diet. This includes moving horses between pasture and dry forage or even between different types of forages, especially

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As with all drugs, side effects may occur. In field studies and post-approval experience the most common side effects reported were signs of discomfort, nervousness, and colic. Other signs reported were: renal insufficiency/failure, anorexia, lethargy, hypercalcemia, behavioral disorders, hyperkalemia, hyperactivity, recumbency, hyperthermia, injection site reactions, muscle tremor, urticaria, hyperglycemia, and fracture. **In some cases, death has been reported as an outcome of these adverse events.** The safe use of OSPHOS has not been evaluated in horses less than 4 years of age or breeding horses. OSPHOS should not be used in pregnant or lactating mares, or mares intended for breeding. NSAIDs should not be used concurrently with OSPHOS. **Concurrent use of NSAIDs with OSPHOS may increase the risk of renal toxicity and acute renal failure.** Use of OSPHOS in patients with conditions affecting renal function or mineral or electrolyte homeostasis is not recommended. Refer to the prescribing information for complete details or visit www.dechra-us.com.

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

* Freedom of Information Summary, Original New Animal Drug Application, approved by FDA under NADA # 141-427, for OSPHOS. April 28, 2014.

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OSPHOS[®] (clodronate injection)

Bisphosphonate.

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Brief Summary (For Full Prescribing Information, see package insert)

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

DESCRIPTION: Clodronate disodium is a non-amino, chloro-containing bisphosphonate. Chemically, clodronate disodium is (dichloromethylene) diphosphonic acid disodium salt and is manufactured from the tetrahydrate form.

INDICATION: For the control of clinical signs associated with navicular syndrome in horses.

CONTRAINDICATIONS: Horses with hypersensitivity to clodronate disodium should not receive OSPHOS. Do not use in horses with impaired renal function or with a history of renal disease.

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

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

PRECAUTIONS: OSPHOS has been associated with renal toxicity. Concurrent administration of other potentially nephrotoxic drugs should be approached with caution and renal function should be monitored. Use of bisphosphonates in patients with conditions or diseases affecting renal function is not recommended. Horses should be well-hydrated prior to and after the administration of OSPHOS due to the potential for adverse renal events. Water intake and urine output should be monitored for 3-5 days post-treatment and any changes from baseline should elicit further evaluation. As a class, bisphosphonates may be associated with gastrointestinal and renal toxicity. Sensitivity to drug associated adverse reactions varies with the individual patient. Renal and gastrointestinal adverse reactions may be associated with plasma concentrations of the drug. Bisphosphonates are excreted by the kidney; therefore, conditions causing renal impairment may increase plasma bisphosphonate concentrations resulting in an increased risk for adverse reactions. Concurrent administration of other potentially nephrotoxic drugs should be approached with caution and renal function should be monitored. Use of bisphosphonates in patients with conditions or diseases affecting renal function is not recommended. Administration of bisphosphonates has been associated with abdominal pain (colic), discomfort, and agitation in horses. Clinical signs usually occur shortly after drug administration and may be associated with alterations in intestinal motility. In horses treated with OSPHOS these clinical signs usually began within 2 hours of treatment. Horses should be monitored for at least 2 hours following administration of OSPHOS.

Bisphosphonates affect plasma concentrations of some minerals and electrolytes such as calcium, magnesium and potassium, immediately post-treatment, with effects lasting up to several hours. Caution should be used when administering bisphosphonates to horses with conditions affecting mineral or electrolyte homeostasis (e.g. hyperkalemic periodic paralysis, hypocalcemia, etc.). The safe use of OSPHOS has not been evaluated in horses less than 4 years of age. The effect of bisphosphonates on the skeleton of growing horses has not been studied; however, bisphosphonates inhibit osteoclast activity which impacts bone turnover and may affect bone growth.

Bisphosphonates should not be used in pregnant or lactating mares, or mares intended for breeding. The safe use of OSPHOS has not been evaluated in breeding horses or pregnant or lactating mares. Bisphosphonates are incorporated into the bone matrix, from where they are gradually released over periods of months to years. The extent of bisphosphonate incorporation into adult bone, and hence, the amount available for release back into the systemic circulation, is directly related to the total dose and duration of bisphosphonate use. Bisphosphonates have been shown to cause fetal developmental abnormalities in laboratory animals. The uptake of bisphosphonates into fetal bone may be greater than into maternal bone creating a possible risk for skeletal or other abnormalities in the fetus. Many drugs, including bisphosphonates, may be excreted in milk and may be absorbed by nursing animals.

Increased bone fragility has been observed in animals treated with bisphosphonates at high doses or for long periods of time. Bisphosphonates inhibit bone resorption and decrease bone turnover which may lead to an inability to repair micro damage within the bone. In humans, atypical femur fractures have been reported in patients on long term bisphosphonate therapy; however, a causal relationship has not been established.

ADVERSE REACTIONS: The most common adverse reactions reported in the field study were clinical signs of discomfort or nervousness, colic and/or pawing. Other signs reported were lip licking, yawning, head shaking, injection site swelling, and hives/pruritus.

POST-APPROVAL EXPERIENCE (December 2018): The following adverse events are based on post-approval adverse drug experience reporting. Not all adverse events are reported to FDA/CVM. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data.

The following adverse events are listed in decreasing order of reporting frequency: renal failure, polyuria, polydipsia, abdominal pain, anorexia, lethargy, hypercalcemia, behavioral disorder, discomfort, hyperkalemia, hyperactivity, recumbency, hyperthermia, injection site reactions, muscle tremor, urticaria, hyperglycemia, and fracture. In some cases, death has been reported as an outcome of the adverse events listed above.

INFORMATION FOR HORSE OWNERS: Owners should be advised to:

- NOT administer NSAIDs.
- Ensure horses have access to adequate water before and after administration of OSPHOS.
- Observe their horse for at least 2 hours post-treatment for signs of colic, agitation, and/or abnormal behavior.
- If a horse appears uncomfortable, nervous, or experiences cramping post-treatment, hand walk the horse for 15 minutes. If signs do not resolve contact the veterinarian.
- Monitor water intake and urine output for 3-5 days post-treatment.
- Contact their veterinarian if the horse displays abnormal clinical signs such as changes in drinking and urination, appetite, and attitude.

Manufactured for: Dechra Veterinary Products
 7015 College Blvd., Suite 525, Overland Park, KS 66211
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It takes 21 days for the colonocytes and microbiome to adjust to any change in diet.

when adding concentrates.

“Even switching forages, which may feel innocuous, results in decreased *Bacteroidetes*,” noted Cubitt. “Owners need to be made aware of the fact that it takes at least 21 days for the colonocytes and microbiome to adjust to any change in diet.”

Costa, recognizing that not all horses can be taken back to “the wild,” said “We need to learn how to deal with the consequences of this altered microbiome.”

Administering ‘Biotics’

Probiotics are defined as live micro-organisms that when administered in adequate amounts confer a health benefit on the host. These supplements have become a household staple in humans and quite probably a barnyard staple as well.

Despite their popularity, evidence of probiotic efficacy in horses is weak. For example, the largest study reported to date involving 200 hospitalized horses showed no benefit of probiotics in reducing *Salmonella* shedding (Parraga et al. 1997).

Costa said that most studies included

only small numbers of horses, and only about half of the studies showed benefits of probiotics.

“Several issues are responsible for this lack of evidence for the therapeutic benefit of probiotics for horses,” explained Giselle Cooke, MB, BS (UNSW), a PhD candidate at the University of Sydney’s School of Pharmacy, Faculty of Medicine and Health. “For example, not enough is known about the equine microbiome to know which species could be most beneficial if introduced as a supplement and then what prebiotic feed they need to support their growth.”

Indeed, a newly published study by Cooke and colleagues (2021) reviewed the available literature surrounding bacterial probiotic administration in horses. They identified only 18 eligible studies and relayed the following:

- Probiotics did not facilitate treatment of colic or prevention of salmonellosis;
- Conflicting results were reported for managing scouring in neonatal foals;
- Supplementing exercising horses did appear to improve aerobic fitness and stamina.

“We also found clear benefits for im-

proving fiber digestibility and reducing grain-induced hindgut acidosis, which have a positive impact on reducing the development conditions such as laminitis,” Cooke added.

Probiotics, Cooke said, also appear to help improve equine immunity.

Cooke and colleagues noted that many of the probiotic species used in horses are bacterial species used in humans. This is likely because of availability and the fact that microbiome research in humans is about 10 years ahead of that in horses.

“Probiotic bacteria often used in horses included *Lactobacillus* and *Bifidobacterium*, as well as the yeast *Saccharomyces cerevisiae* and *S. boulardii*,” Costa said.

The fact that many available probiotics aren’t “horse derived” might not be as important as you think. Probiotic supplements don’t really establish the specific bacteria or yeast being fed, but rather they increase the diversity and richness of the microbiome.

“The goal of probiotic supplementation is ultimately to achieve the best metabolomic effect,” said Cooke. “That

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*Slovic, N. Polysaccharide Treatment Reduces Gastric Ulceration in Active Horses. *Journal of Equine Veterinary Science*. 50 (2017) 116–120.

Roles of Other Microbes

There are other microbes that can have influences on equine gut health. Here are some of the most important:

- Methanogenic archaea—metabolize hydrogen gas and carbon dioxide to produce methane and support the degradation of cellulolytic bacteria;
- Anaerobic fungi—*Promyces equi*, for example, possesses a major exoglycanase that can digest cellulose;
- Bacteriophages—viruses that infect bacteria. There are an estimated 1010 bacteriophages per gram of equine feces. It is believed that bacteriophages influence the fitness of intestinal bacteria and support colonization and host adaption. *Siphoviridae*, *Myoviridae*, *Podoviridae* and *Orthopoxvirus* in horse feces have been reported, but a large number of viruses remain uncharacterized;
- The role of *Ciliates*—intestinal protozoa—remain unclear, as they have little role in cellulose digestion.

It is important to appreciate that it isn't just the individual microbes that are important, but the commensal relationships between them. Metabolic pathways essential for nourishment, etc., depend on the interactions of these microbes.— *Dr. Stacey Oke*

is, the products of microbial fermentation with beneficial biochemical actions throughout many of the horse's systems. Diversity supports an optimal metabolome."

Costa added, "The species used in



Horses with 'leaky gut' have bad attitudes and can be girthy.

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commercial products have proven *in vitro* benefits, and I don't doubt they might help in horses with dysbiosis or diarrhea. I am, however, advocating for the discovery and development of strains that can in fact colonize horses rather than behave as transients like the current products."

Not Just the Pros. If your owners are interested in probiotics, they might also be interested in prebiotics. These compounds are defined as "a selectively fermented ingredient that results in specific changes in the composition and/or activity of the gastrointestinal microbiota, thus conferring benefit(s) upon host health" (Davani-Davari et al. 2019).

In terms easier to explain to owners, prebiotics are specialized plant fibers that "feed" the microbiota.

Examples of these fiber-based molecules include fructo-oligosaccharides and galacto-oligosaccharides. Prebiotic fibers can be found in feeds such as sugar beet pulp.

Finally, another type of "biotic" currently being explored and worthy of mention are postbiotics. These are molecules produced by the microbiome.

The best example of a postbiotic currently available is butyric acid.

This VFA is certainly well known as a source of energy for horses, but it also has a direct benefit on colonocytes. Butyric acid contributes to the health of

the intestinal tract and tight junctions and is believed to play an important role in "stopping the leak," so to speak. Some commercial products designed to support the equine intestinal microbiome contain sodium butyrate. But again, studies demonstrating efficacy are lacking.

Prebiotics and probiotics might have a symbiotic relationship. These supplements might help "jump start" the microbiome after suffering dysbiosis secondary to stress or to maintain a healthy microbe community.

Take-Home Message

In addition to each horse having its own intestinal microbiome fingerprint, each horse's microbiome can change naturally (without any management, diet change, etc.) from season to season with fluctuations in ambient temperature.

We need to understand these normal variations before being able to determine the effect of diet, disease, drugs, etc., on the microbiome and "assigning blame" to a particular component of the microbiome in the face of disease.

"Moving forward, we need to improve our understanding regarding exact changes with various disease states. Only then can we implement appropriate therapies aimed at microbiome restoration during times of stress," Cubitt concluded. **EM**

KEYS TO THE NUTRITION VAULT

Kent Nutrition Group is offering a helping hand to veterinarians seeking to answer client questions about equine nutrition.

By Kimberly S. Brown

Kent Nutrition Group wants to become a resource to equine veterinarians and their clients.

Longevity, quality, dependability: These are hallmarks you seek in a company with which you want to do business. Kent Nutrition Group (KNG) is made up of the Kent and Blue Seal brands. Kent got its start in Iowa in 1927 and Blue Seal was begun in Massachusetts in 1868 ... 153 years, now that's some longevity! Kent has retailers in the Midwest, and Blue Seal has retailers in the eastern U.S., from Maine to Florida. Veterinarians and their clients in other parts of the country do have access to these brands. Contact Kent Nutrition Group at 866-647-1212 to learn more.

Research always has been and continues to be the foundation of the products produced by the Kent and Blue Seal brands. The company's Kent Research Farm—an 800-acre working farm located 10 minutes from the company's headquarters in Muscatine, Iowa—is where Kent Nutrition Group experts perform real-world product testing. Those quality products are manufactured and tested every day at the company's award-winning plants, which ensures that they are consistent and safe.

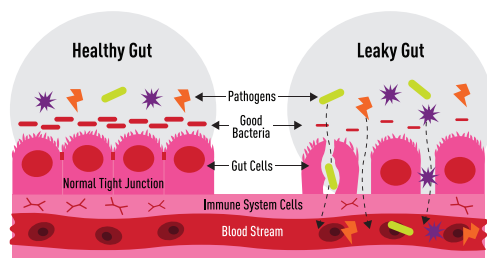
It's no wonder the Kent Nutrition Group mission is: "We strive to be the most trusted and preeminent regionally focused animal nutrition brand in the United States." The three "pillars"



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gutWise™ Technology

gutWise™ Technology is a proprietary blend of prebiotics, probiotics, marine-sourced calcium, and NutriVantage® for horses that helps maintain total digestive and gut health. With the intestinal tract containing over 75% of the body's immunity cells, a stable and healthy digestive system is vital to the performance, behavior and overall health of the horse.



Prebiotics are of a blend of yeast nutrients, metabolites and cell wall components that help support gut health and function by balancing microbiota, preserving gut integrity and modulating immunity. Prebiotics such as Beta-Glucans help stimulate the immune system while Mannans help lower pathogen colonization in the intestinal tract.^{1,2}

Probiotics are of a blend of live beneficial microorganisms that help maintain a stable and healthy digestive and fermentative environment by supporting the intestinal balance of good bacteria at the expense of bad bacteria. Probiotics such as *Bacillus subtilis* may not only 'crowd out' pathogenic bacteria that can damage the gut lining, but also produce substances that are known to have a positive impact on overall health.³

Butyric Acid and Zinc are a powerful combination of nutrients that help strengthen the intestinal tract of the horse, which can lead to a lower incidence of leaky gut syndrome. By strengthening gut cell tight junctions and improving the integrity of the intestinal lining, harmful substances such as pathogens, parasites and toxins maybe less likely to cross the border into the bloodstream.^{4,5}

1. Burdick Sanchez et. al., Innate Immunity, 2013.

2. Posadas et. al., Yeast Pro- and Paraprobiotics, 2017.

3. M.A. Suva et. al., Novel insight on probiotic *Bacillus subtilis*: Mechanism of action and clinical applications. *J Curr Res Sci Med* 2016;2:65-72.

4. Peng, L. et al. Butyrate Enhances the Intestinal Barrier by Facilitating Tight Junction Assembly via Activation of AMP-Activated Protein Kinase in Caco.

5. Zhang, B. et al. Zinc prevents *Salmonella enterica* serovar Typhimurium-induced loss of intestinal mucosal barrier function in broiler chickens. 2012. *Avian Pathology*. 41: 361-367.

professionals with some basics about their companies and offerings. Then, if you attend the live AAEP Convention, they would like you to stop by booth #1228 to meet their experts and find out how Kent Nutrition Group can assist you in your practice. They also will have a new Equine Resource Guide that veterinarians can use themselves or can share with owners. If you aren't attending the AAEP Convention live, then simply contact the Kent Nutrition Group at 866-647-1212 or service@kentww.com to receive a guide with more information about the services they offer to equine veterinarians.

Nutrition by Condition?

Horses have individual needs based on life stage, activity level, and metabolism along with additional nutritional, health and management concerns. Many of these challenges or "issues" have potential nutritional solutions. Kent Nutrition Group offers some basic recommendations for some of the most common issues. And of course, their in-house nutrition staff members are always available to assist veterinary practices in developing specific feeding programs for individual horses.

that Kent Nutrition Group uses to develop and fulfill its mission are summed up by the words "quality, service and trust."

KNG and Equine Veterinarians

So how does Kent Nutri-

tion Group fit in with the equine veterinary industry? This group wants to be a resource to the veterinarians and their clients in the regions offering Kent and Blue Seal products. Kent Nutrition Group experts can help answer questions

about day-to-day equine nutrition and assist veterinarians and their clients for those special-needs horses and situations.

In this article, Kent Nutrition Group wants to provide veterinarians, vet techs and other industry



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Horses may be hard keepers due to metabolism, activity level or intensity, age or other health reasons. Increased caloric intakes can come in many ways and will depend on the specific cause of the horse's underweight condition.

Hard Keeper/Underweight. Horses that are hard keepers or are underweight need increased caloric intakes. Horses may be hard keepers due to metabolism, activity level or intensity, age or other health reasons. Increased caloric intakes can come in many ways and will depend on the specific cause of the horse's underweight condition. The foundation of any feeding regimen is good-quality hay, and the Kent Nutrition Group professionals can help you understand or explain the various types of hays and hay substitutes available and what each offers to the horse needing to gain or maintain weight. Using grain or a feed/supplement with higher fat content can also increase a horse's calor-

ic intake. Feeding prebiotics or probiotics might be beneficial for the horse's GI tract health, thus enabling the animal to better utilize the nutrients in its feed.

Easy Keeper/Overweight. These horses still require the basic daily nutrients to keep them healthy, but they need those nutrients in a lower-calorie diet. In many cases, owners often feed less of a regular feed in an attempt to reduce calorie intake, but those feeds are fortified to provide the nutrients a horse needs at a specific feeding rate. Lower that rate, and you reduce the required nutrients. Feeding a nutrient-dense ration is a good solution for these horses, which also might require reduced grazing time or a lower-caloric hay source.

PPID. Horses with pituitary pars intermedia dysfunction (AKA Cushing's disease) benefit from a low-starch and low-sugar diet. Understanding what "low" means to an individual horse based on weight, age and breed can help you recommend the best nutritional program to keep that horse healthy. Sometimes a higher-fat diet is needed if the horse needs more calories without an increase in starch and sugar. These horses also need to be fed to benefit their immune function, providing them with antioxidants on a daily basis. It is also important to have a proper daily balance of minerals and vitamins daily.

Equine Gastric Ulcer Syndrome. So many stresses! Research has shown that even a group of broodmares in a field can have individuals develop ulcers with just changes in herd status! For our pleasure and competition horses, just loading on a trailer and traveling is a proven stressor that can lead to gastric ulcers.

A proper feeding strategy can help in the management of some of these issues. Maintaining a consistent feed intake based on type and amount is important to horses who might be prone to gastric ulcers. Feeding multiple small meals can also help, as

can using a low-starch and low-sugar feed. Providing adequate hay/fiber is critical, and using alfalfa hay for higher calcium amounts has proven beneficial to some ulcer-prone horses. Of course, a veterinarian might recommend a program of antacids or other medications to combat or heal equine gastric ulcers.

Types of Horse Feed Products

Could you answer a client who asks you about the difference in a "complete" horse feed and a "total mixed ration"? Do you know the feeding rates for specific nutritional supplements and when they are below useful values or go into the "toxic" range, especially if they are being fed in multiple supplements to one horse? What is an "extruded" feed?

Let's start with the last one first. **Extruded** (pressure cooked) is the term for any combination of ingredients that have been ground, mixed and conditioned ("cooked") using heat, steam and high pressure prior to being forced through a die. The resulting feed product exiting the die expands upon rapid cooling into a low-density nugget.

- The ingredients found in extruded nuggets may include, but are not limited to, grains such as corn or

oats; plant proteins such as soybean meal; forage products such as alfalfa meal; roughage products such as beet pulp or soybean hulls; vegetable oil; molasses; minerals and/or vitamins.

- With uniform grinding and blending of ingredients, extruded nuggets offer consistent nutrition in every bite with little opportunity for sorting.
- The process of extrusion improves starch and protein digestibility and utilization in the foregut; less starch reaching the hindgut means reduced risk of gas colic.
- The low-density nugget promotes a slower, more natural rate of intake leading to reduced risk of digestive upsets such as choke and colic.
- Extruded nuggets are easily chewed and consumed by horses and can be “wetted” to make a mash for horses with poor dentition.

A **pelleted** feed is any combination of ingredients that have been ground, mixed and subsequently formed into a pellet form utilizing heat, moisture and pressure.

- The ground ingredients found in pellets might include, but are not limited to, grains such as oats, plant proteins such as soybean meal, forage prod-



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For our pleasure and competition horses, just loading on a trailer and traveling is a proven stressor that can lead to gastric ulcers.

- ucts such as alfalfa meal, roughage products such as beet pulp or soybean hulls, vegetable oil, molasses, minerals and/or vitamins.
- With uniform grinding and blending of ingredients, pellets offer consistent nutrition in every bite with little opportunity for sorting.
- The process of pelleting often improves ingredient digestibility and nutrient utilization.
- Pellets are easily chewed and consumed by horses and can be “wetted” to make a mash for horses with poor dentition.
- Pellets are generally very dense (low bulk) making them convenient to store, handle and feed.

A **Textured** feed is any combination of grains or other ingredients, pellets, extruded nuggets, molasses and/or vegetable oil blend-

ed together. The various components are typically visible in the feed.

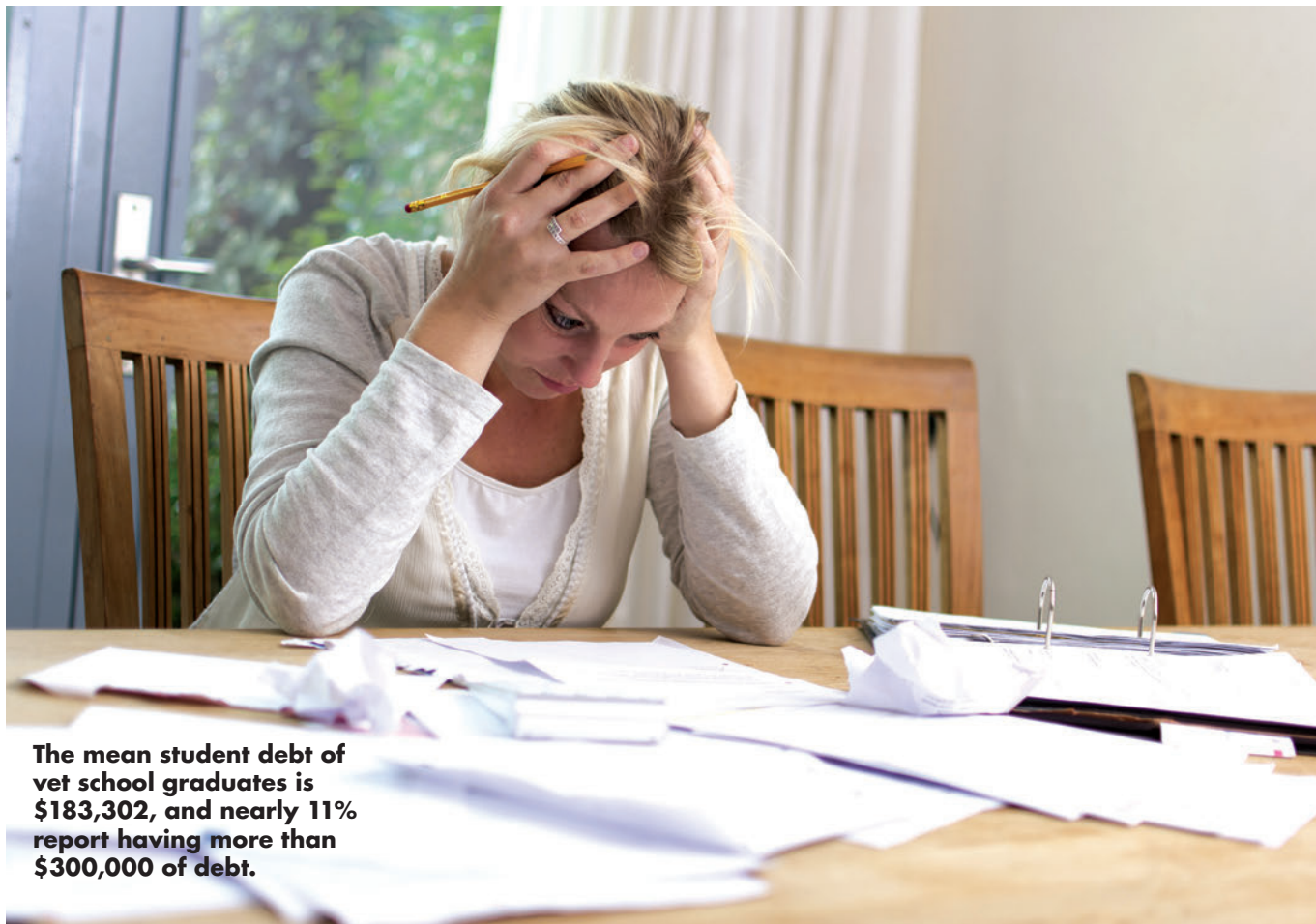
- The most common grains found in a textured feed include corn, oats and/or barley. Corn and barley should be processed (coarse cracked, rolled, flaked) for best digestibility. Oats can be fed whole or processed with little difference in digestibility.
- Feed might appear “wet” or “dry” based on the amount of molasses and/or oil added.
- Textured feeds with higher molasses content often results in improved feed palatability and might be helpful when adding supplements to the feed or for encouraging intake in horses with depressed appetites.
- Adding molasses or oils helps to control potential “dust” from grains or

loose ingredients.

- Textured feeds often promote additional “chewing,” which serves to increase saliva production and slow intake of fast eaters.

Summary

There is so much we know today about feeding horses of all ages, breeds, activity levels, physiological and reproductive status, body condition and for specific health conditions. But there is still more to learn. Researchers are making giant steps toward a better understanding of the equine microbiome (see cover story in this issue), which is shedding light on new ways of feeding and managing the microbes in the horse’s gut. Join with experienced equine nutrition advisors at Kent Nutrition Group to better serve your clients and your patients.



The mean student debt of vet school graduates is \$183,302, and nearly 11% report having more than \$300,000 of debt.

Managing Educational Debt

As educational debt among veterinarians has grown, innovative solutions are needed.

By Amy L. Grice, VMD, MBA

Veterinary students accumulate a substantial amount of educational debt while completing four years of veterinary school. Some continue on to internships and residencies, during which time they often defer repayment of student loans, allowing interest to accrue and increasing their indebtedness.

According to the AVMA 2020 State of the Profession Report, the mean debt of new graduates was \$183,302, and 10.7% of graduates reported more than \$300,000 in student loan debt. Those who attended off-shore veterinary schools were more likely to have higher amounts of student loans. About 30% of equine-focused graduates had no debt compared to about 20% of graduates

entering companion animal practice.

Physicians in the U.S. also take on considerable debt to finance their education. Median indebtedness at graduation for an MD is now more than \$170,000 for graduates of U.S. medical schools.

A survey that included 102 U.S. medical schools showed that “students with higher debt relative to their peers at their home institution reported higher



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¹ Data on file.

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

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

⁴ Kim DY, Taylor HW, Moore RM, Paulsen DB, Cho DY. Articular chondrocyte apoptosis in equine osteoarthritis. *The Veterinary Journal* 2003; 166: 52-57.

⁵ McIlwraith CW, Frisbie DD, Kawcak CE, van Weeren PR. *Joint Disease in the Horse*. St. Louis, MO: Elsevier, 2016; 33-48.

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frequencies of feeling callous toward others, were more likely to choose a specialty with a higher average annual income, were less likely to plan to practice in underserved locations and were less likely to choose primary care specialties. Students with higher aggregate amounts of medical student loan debt were more likely to report high levels of stress from their educational debt, to delay getting married and to report disagreement that they would choose to become a physician again, if given the opportunity to revisit that choice. Increases in both aggregate and relative debt were associated with delaying having children, delaying buying a house, concerns about managing and paying back educational debt, and worrying that educational debt will influence one's specialty choice."

These findings regarding medical students are observed in veterinary students, as well. In the equine field, it is common for new graduates to leave the profession in the first five years of their careers, often in search of higher salaries due to concerns about their debt. First job salaries after internship in the equine sector were reported to be \$63,000 for females and \$73,000 for males in the 2016 AVMA AAEP Economic Impact Study. In contrast, starting salaries in exclusive companion animal private practice without internship were \$90,893 in 2020. Managing large amounts of debt while building a life as a young adult is difficult and stressful. Life choices cannot help but reflect these realities.

Financial Training for Students

Research has shown mixed results for financial literacy training directed at veterinary students. According to the American Association of Veterinary Medical Colleges (AAVMC), "the

natural assumption is that greater levels of financial literacy will lead to better financial decision-making in terms of debt acquisition and debt retirement. However, a closer look at the professional literature concerning financial literacy and behavioral change suggests that there is not a direct causal relationship between the two."

Financial literacy is defined as the ability to use skills and information to manage money in ways that promote financial well-being. It might seem intuitive that minimizing the amount

be far more successful at influencing behavior if provided within three to six months of graduation.

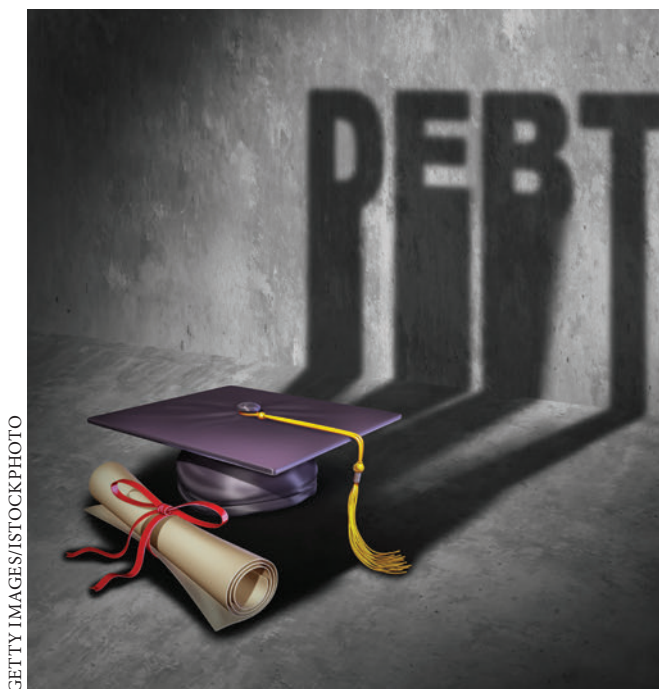
Conventional wisdom suggests educating around this topic very early in a student's academic career, but studies show that such ill-timed programming is predictive of riskier behavior in spending and greater loan amounts. When the programming is focused during a window when it is most relevant and when new graduates can begin to act on the new knowledge, individuals are more likely to make more informed and better decisions about debt management, reported Greenhill.

Smart Repayment of Student Loans

While avoiding as much educational debt as possible is recommended, for some students it is inevitable that in order to achieve their degrees, they will graduate with significant loan obligations. Once graduated, the emphasis must shift to smart repayment. Every situation is different, so every repayment strategy will differ. Some veterinarians double down on their debt and pay it off as fast as possible.

Dr. Caitlin Daly, owner of Mid-Coast Equine in Maine, has worked diligently on her debt for 10 years. Originally, she had a total debt of \$186,908 that ballooned to \$242,000 after being late in filing her income certification, a mistake that resulted in the loan interest being compounded. She has reduced it to \$91,000 through aggressive payback, and she expects to have the entire balance paid in full by the end of 2021.

According to Daly, "I made the decision to commit my income and life (temporarily) to the payment of my student loans when the noose around my neck became too tight to breathe. My



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borrowed will have a positive effect on later outcomes, but a percentage of students continue to borrow in excess of annual budgets for tuition, books and living expenses.

Lisa Greenhill, AAVMC's senior director for institutional research and diversity, said that financial literacy programs that have been shown to be effective are deadline oriented, short-term programs with a specific focus and desired outcome. For example, financial education literature suggests that programming on loan repayment for graduating fourth-year students will

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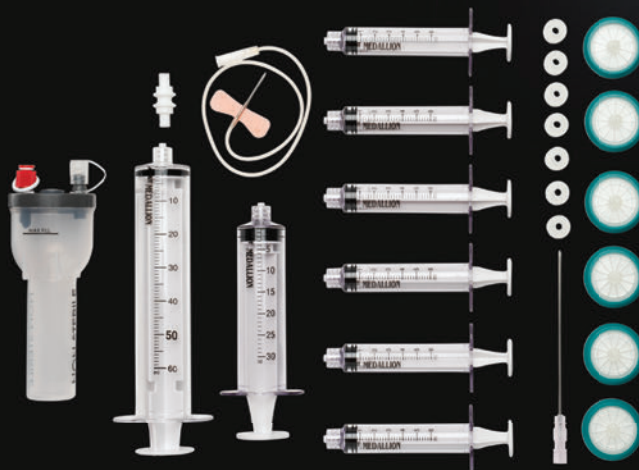
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student loans got in the way of almost everything. Being a young business owner, I was unable to get a business loan or home mortgage without the help of my parents. It didn't matter how much 'promise' I had as a young practitioner. I was tired of feeling paralyzed—unable to move my life in any significant direction.

"More importantly, I was tired of the ever-consuming feeling of jealousy of those that had what I felt entitled to after the years of hard work and letters that followed my name.

"I began my journey in January of 2020 by committing \$30,000 of my savings (following Dave Ramsey and leaving only \$1,000 in my savings)," she said. "It was really scary because I basically gave all of my money away in our 'slow season,' then COVID hit shortly thereafter (and a divorce that eliminated any financial help from a significant other). But seeing the immediate drop

in my loan balance was intoxicating.

"I would not have been able to make such an impact if it had not been for a few things," she continued. "First, the pause on student loan interest for the last year and a half. I estimate that this has saved me approximately \$20,000 in interest charges. Second, being a practice owner. There are so many increased risks and responsibilities when you own a veterinary practice, but one of the biggest advantages is the profit is yours to invest how you see fit. For me, it has been in my student loans. As the practice owner, I also have been able to write off a number of expenses (cell phone, internet, car, insurance, etc.) that an associate is not able to do. Third, having a real estate investment. Buying cheap and selling high will enable me to pay off the remaining educational debt with the sale of the home."

The advice that Daly has for other veterinarians with high educational debt is: "Decide what you want, what your goals are. An aggressive debt repayment plan isn't for everyone. I do not have any children to support, but I also do not have a spouse to help with any expenses. Stop the narrative of entitlement—yes, we went to school, and yes, we put in a lot of hard work. But having a nice home, a nice car and nice things are not going to come immediately unless you make sacrifices elsewhere or have significant financial help. If your goal is to be financially free of student loan debt, you need to be committed to a lifestyle without immediate gratification. The sacrifices you make (the smaller, cheaper apartment, the extra shifts, the lack of date nights) will pay off in the long run.

"The end is near for me, and it tastes so sweet," Daly said. "I finally have the freedom to dream about what my future will look like. Without debt I can afford to be more imaginative. I can follow a path that is true for me. I can have a healthier relationship with this profession because I no longer feel like I *have* to go to work; I *want* to."



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AAEP Table Topic Advice

At the 2020 AAEP Annual Convention, Dr. Martha Mallicote, clinical assistant professor of large animal medicine and director of the Veterinary Business Certificate Program at the University of Florida College of Veterinary Medicine, presented "Loan Repayment: Programs and Strategies for Equine Vets."

The first step, she said, in determining the best repayment strategy was identifying all of the outstanding loans, the loan servicer, any grace period and the interest rate, then determining what monthly payment amount will be possible after graduation after consideration of expected compensation. Utilization of a repayment calculator can be very helpful and remembering to apply several months in advance of the end of the grace period, for whichever repayment program is chosen, is important. She recommended choosing automatically deducted payments, which can reduce the interest rate by 0.25%, which can add up quickly.

Loans in repayment or the grace period are eligible for consolidation, Mallicote noted, and although not all types of loans are eligible, most federal loans are. Repayment plans, she explained, can be standard fixed plans or income driven. There are a variety of income-driven plans, and a borrower must be careful to understand the specifics of each type. Most importantly, borrowers must plan for the income tax that will come due on any amount that is forgiven in the year the repayment ceases. This can be a large sum, all due in a single year, she warned. By carefully analyzing repayment strategies, graduates can plan their approach to this financial challenge.

Other Debt Repayment Strategies

Equine veterinarians adopt many different strategies for debt repayment. Many utilize sources of income outside of their salaries from veterinary

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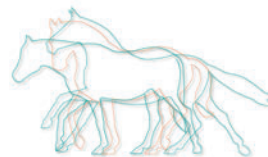
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As educational debt among veterinarians has grown, innovative solutions are needed.

medicine. Drs. Bret and Chelsea Luedke earned money from real estate. Their educational loans totaled \$160,000, but they were able to pay them off in six years.

Bret Luedke said, “We had steady income, but with internships and young associate positions, we made only modest payments monthly on Income Based Repayment. The only way we paid the debt off so quickly was two real estate ‘fix and flips’ where we did all the work ourselves. We had lucky timing both times when we were ready to sell, but really it was just a lot of hard work in the evenings and on weekends (mostly before kids), even though we were exhausted from long hours at the practice. I don’t think we could ever have made progress with our associate salaries alone.”

Dr. Tony Bartels has focused his career on helping veterinarians man-

age their educational debt. His blog at <https://vinfoundation.org/author/tonyb> is a source of excellent information and recommendations. He co-facilitated a Table Topic on Student Debt at the 2020 AAEP Annual Convention, where he recommended investing money in a robo-advisor investment account to save for future taxes on loan forgiveness if an income-based repayment program is undertaken. In this type of account, the investor chooses his/her risk tolerance, then the investments are set up automatically.

He said, “We are not investment professionals—we are veterinarians. So we should not try to manage our own investments. We are better off using an index fund or robo-advisor.”

Because stock market values have expanded so dramatically in the last year, many have seen large increases in their equity accounts. It is important to keep

in mind that these gains are taxable, but equally important to plan for the big tax bill that will be due in 20 years at the time of debt forgiveness.

VIN (Veterinary Information Network) has a simulation program to help people decide the best way to proceed in paying their educational debts and to determine the least costly options. This is found at www.vin.com/student-debtcenter. It is Bartels’ opinion that the Pay As You Earn Repayment Plan (PAYE Plan) for a 20-year term might be the best plan for veterinarians, as long as they invest enough monthly to earn sufficient funds to pay the eventual tax on the forgiven amount.

Some veterinarians with high debt levels have chosen a spartan lifestyle, adopting the approach advocated by Ramsey, an American personal finance personality, radio show host, author and businessman. He is an evangelical



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Steve Adair, III, MS, DVM, Dipl.ACVS, Dipl.ACVSMR

Associate Professor Equine Surgery
University of Tennessee



Christian, and he hosts a nationally syndicated radio program. According to Dr. Brittany Burroughs, she and her husband are a “Dave Ramsey almost success story.”

Her husband graduated with \$10,000 of undergraduate debt and \$195,000 in loans from veterinary school. She graduated with \$86,000 debt from her undergraduate degree and \$340,000 from veterinary school. They bought a small starter home once graduated (\$80,000) and opened a practice a year later.

Brittany Burroughs said, “I worked ER double shifts and picked up small animal relief on the side. We use the Every Dollar app for budgeting. Vacations are conferences or camping. We buy salvage vehicles and manage our practice with low overhead. Every extra dime goes toward loans. We are nine years out of school now and our educational loan balance is down to just \$160,000. The soul-crushing debt is leaving, and the end is in sight. It takes focus and dedication, but it’s possible!”

Living in an area with a low cost of living and low housing prices, having a spouse contributing income to the family, and having a dedication to eliminating debt as fast as possible are all seemingly necessary or positive contributing components to this approach.

Others take advantage of income-based repayment programs and save for the future tax consequences. Dr. Eric Kates worries that the financial opportunities that are missed due to debt repayment can be substantial. He said, “Paying off school debt is admirable and the sacrifices that these stories tell are amazing, but the long story and cost is far higher. Failure to put money away for your children’s college educa-

tion, inability to buy real estate (which will significantly appreciate over time), delaying fully funding your retirement accounts, and ultimately saving and investing in passive income accumulators will be lifelong issues. The multiplication factor (opportunity cost) for money that is not invested as a young person and put to work is extraordinary. It is a sad commentary on our industry. To me, the answer would always be finding ways to earn more, not spend less.”

Young veterinarians in areas with a high cost of living might struggle more than others. Personal circumstances differ considerably. Dr. Brigitte Gravitt explained, “I am married with a

mortgage and two young children. My biological time clock could not wait any longer to have them. In my area, renting is very expensive. We looked into living in a camper, but we wouldn’t have saved enough money on rent to make it worthwhile, and we didn’t want to take the risk with hurricanes and small children. We have absolutely no family around to help with kids. I’m an equine practitioner, so I’m working the most hours I can (more than full time), but I cannot take a second job.”

As Dr. Jennifer Lorenz commented, “I think it’s really important people understand all their options. Recently AAEP

had a Round Table on student debt, and it was refreshing to hear it is OK not to pay off your debt as quickly as possible. As someone who has not been able to pay off debt as quickly as I would like due to a variety of circumstances, it was a relief to hear someone say it’s OK to not plan on paying it off—that there are other options or plans that are just as valid.

“The programs in place for debt forgiveness can be the plan for many of us,” she continued. “VIN has a free computer program to help decide what may be the best path of repayment. It’s also important to understand that student loans changed in 2005/06 when the loan

program was turned over to private organizations. What might have worked before may not work now for multiple reasons.”

Take-Home Message

As educational debt among veterinarians has grown, innovative solutions are needed. Minimizing the amount of loans, exploring repayment options thoroughly and having a financial plan (“Hope is not a strategy”) are all necessary ingredients to a successful student loan repayment plan.

Ways to increase equine veterinary compensation include improved efficiency, increased fees and practice ownership as soon as possible in a doctor’s career. There are many paths to the same goal of being unburdened by educational debt. **EM**

Reference

James Rohlfing, Ryan Navarro, Omar Z. Maniya, Byron D. Hughes & Derek K. Rogalsky (2014) Medical student debt and major life choices other than specialty, Medical Education Online, 19:1, 25603, DOI: 10.3402/meo.v19.25603



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Research on cooling methods for horses can help these athletes, especially in hot, humid climates.

Sports Medicine Updates

Here is a sampling of research from around the world that can help veterinarians better care for their competitive equine patients.

By Nancy S. Loving, DVM

One veterinarian told EquiManagement that the pandemic allowed competitive horses to be sounder and better trained than at any time in recent memory because of the time away from competition and the time and focus of riders on their horses.

We are bringing equine veterinarians some research updates on sports medicine that can help you in managing

these competitive horses as they return to work.

Comparison of Cooling with Five Different Methods

Athletic horses typically need help cooling when exercising in hot temperatures, especially in humid climates. High-speed events such as racing or the cross-country phase of eventing and long-duration events such as endurance racing all tend to increase a horse's internal heat, which

must be dissipated efficiently. Sweating (evaporative cooling) can only keep up to a certain degree; ancillary cooling measures then become necessary to prevent heat stress.

A Japanese study evaluated the efficacy of five different cooling methods in five Thoroughbred racehorses at the track [Takahashi, Y.; Ohmura, H.; Mukai, K; et al. A Comparison of Five Cooling Methods in Hot and Humid Environments in Thoroughbred Horses.



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In one study, scraping cold water off did not improve time to recovery temperature of exercised horses.

Journal of Equine Veterinary Science
May 2020 <https://doi.org/10.1016/j.jevs.2020.103130>]. A lengthy catheter was passed through the jugular vein to end with its tip at the pulmonary artery. In the other jugular vein, a catheter was placed for acquisition of blood samples to measure plasma lactate. Rectal temperatures were obtained at 0, 15 and 30 minutes after the start of cooling.

Each horse experienced each cooling method following a standardized exercise regimen of walk, trot and canter on an inclined treadmill. Within two minutes of the horse's pulmonary arterial temperature reaching 107.6 degrees Fahrenheit (42 degrees Celsius), the cooling off period began for 30 minutes.

The five different cooling methods were applied as the horse continued to walk at 1.7 m/second (3.8 mph) on a level treadmill for 30 minutes, except for the showering method that had the horse stand still in stocks. Here are the cooling methods used:

- Control with no additional cooling

- Cooling with fans
- Cooling with intermittent application of cold water (10 degrees Celsius or 50 degrees F) with scraping
- Cooling with intermittent application of cold water without scraping
- Showering with tap water (26 degrees Celsius or 79 degrees F)

To cool with cold water (in a bucket with crushed ice) with or without scraping, the horse was taken off the treadmill every three minutes and all of the body—but not the head and neck—were doused with cold water twice on each side for a total of 16 liters. For the scraping protocol, the horse was returned to the treadmill once as much water was removed as possible; if not scraped, the water-soaked horse went back on the treadmill.

For horses receiving showered tap water, no treadmill walking was included; the horse stood still as it was washed continuously for 30 minutes with tap water using five hoses attached to a shower. All of the horse was soaked

except for the head and neck. This mirrored the effects of whole-body immersion in water. More than 20 times the water was used for the continuous shower as was used for the ice water application, with or without scraping.

The objective was to identify the time when the pulmonary artery temperature returned to 102.2 degrees Fahrenheit (39 degrees Celsius)—the target temperature. The results:

- Control horses did not reach 102.20 F by the end of the 30-minute cooling period.
- The shower hosing accomplished the target cooling temperature within nine minutes, significantly faster than any of the other methods.
- Cooling with the fan to the target temperature took 14.5 minutes.
- Cooling with cold water and scraping to the target temperature took 11.6 minutes.
- Cooling with cold water without scraping to the target temperature took 9.8 minutes.

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Veterinary awareness and preparedness is important at elite endurance competitions.

- Scraping of cold water “did not result in any additional cooling effects.”
- Plasma lactate concentrations were no different by 30 minutes in any protocol.

The authors noted that “efficient cooling is best achieved in hot, humid conditions not by enhancing evaporation but by enhancing conduction, because humidity limits evaporation. The essential feature is not the water temperature or the use of scraping but that the horse is kept covered in water cooler than its body temperature over an extended period.”

Endurance Completion on a National Level

At the 10th International Conference on Comparative Exercise Physiology, participation in equine endurance competition in New Zealand was evaluated on the national level [C.W. Rogers, E.K. Gee, C.F. Bolwell, et al. An overview of national level equine endurance competition in New Zealand. Massey University School of Veterinary Medicine. *Comparative Exercise Physiology 14 Supplement 1*].

It is noted that preparation for international (FEI) competition requires participation in local and regional

events. The study reviewed endurance competitions between 2010/11 and 2015/16 with 7,493 starts. The median number of events attended each season by the horses was three, with a range of one to six starts per season. Many (46%) of the ride entries competed in 40 km races, while 35% competed in the 80 km distance. About 19% of horses competed in the 160 km divisions.

Ride completion decreased with longer distances—91% completed the 40 km distance, whereas 51% completed the 160 km distance.

Metabolic disqualification occurred in 0.8% of 40 km rides compared to 9.2% in 160 km rides.

Lameness was a more predominant cause of non-completion, with 3.6% of 40 km horses pulled for lameness compared to 34.7% of 160 km competitors.

In general, the longer the duration and distance of the race event, the higher the attrition to non-completion.

Risk Factors Associated with the Need for Emergency Treatment at an Elite Endurance Competition

At a World Equestrian Games endurance racing competition, 47 horses that were deemed “unfit to continue” and

were eliminated from the course were in need of emergency treatment. For comparison purposes, in an attempt to discern potential risk factors and biochemical markers, five horses that had completed the competition were included in the study [Simon, F.; Pronost, S.; Benamou-Smith, A.E.M. A retrospective study of 47 eliminated elite endurance horses requiring emergency treatment (WEG). Vetagrosup Lyon Veterinary Campus France. *Comparative Exercise Physiology 14 Supplement 1*].

Diagnoses of reasons for elimination included:

- Dehydration and electrolyte imbalances in 70%
- Ileus in 64%
- Diaphragmatic flutter (thumps) in 21%—these occurred later in the race
- Myopathy in 9%—these occurred earlier in the race and were associated with hematological abnormalities
- Colic in 9%
- Exhaustion syndrome in 5%
- Neurologic syndrome in 2%

It is noteworthy that 40% of horses with dehydration developed paralytic ileus. In addition, horses with myopathies were more at risk of ileus even without evidence of dehydration. The authors comment that biochemical changes were mild and not helpful in identifying sick horses.

In general, horses received an average of 21 liters of intravenous fluid for treatment. All horses responded to treatment successfully, likely due to early recognition and aggressive treatment.

Omega-3 Fatty Acid Supplementation Effects on Cardiac Physiology

Use of omega-3 fatty acids has been tried in human exercise efforts to improve cardiac function and optimize oxygen consumption during endurance exercise. A study evaluated the effects of feeding 20 grams a day of a DHA supplement for 90 days to 3-year old trotters [Leleu, C.; Mailliot Pivan, A.S.; Jothy, S.; and Zohar, E. Effects of DHA

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For additional information, see brief summary of prescribing information on the following page.

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

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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.

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

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

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

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

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

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

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

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

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

See Product insert for complete Adverse Reaction information.

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

Effectiveness: The effectiveness phase was a randomized, masked, controlled, multicenter, field study conducted to evaluate the effectiveness of Zimeta (dipyrone injection) administered intravenously at 30 mg/kg bodyweight in horses over one year of age with naturally occurring fevers. Enrolled horses had a rectal temperature $\geq 102.0^{\circ}\text{F}$. 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.

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supplementation on cardiac response in trotters: a double-blind controlled study in France. *Comparative Exercise Physiology 14 Supplement 1*].

Heart rate and heart rate variability (HRV) were measured at rest. With exercise on the track, researchers obtained speed, heart rate and lactate levels, along with DHA plasma concentrations, before and after the course of supplementation.

The control group was comprised of 10 horses, and the DHA group included 15 horses.

Here is what the researchers found:

- Plasma DHA concentrations increased in the DHA group but not the controls.
- Resting heart rate was constant in the DHA group but increased in the control group.
- The increase in V200 during exercise was significantly higher for the DHA-supplemented horses compared to the controls.

In summary, supplementation with DHA caused “significant changes at rest and exercise without affecting lactate metabolism.”

Exercise Arrhythmias and Omeprazole

Omeprazole is used commonly in sporthorses and racehorses to mitigate causal effects of stress on gastric ulcer disease. Human medicine findings have correlated an increased risk of cardiac arrhythmias with omeprazole. A study evaluated the effects of omeprazole on electrolytes and cardiac arrhythmia in 20 Standardbred racehorses [Harrison, N.; Webster, B.; Afonso, T.; and Franklin, S. Effects of Omeprazole on electrolyte balance and exercise arrhythmias. University of Adelaide, Equine Health & Performance Centre, Australia. *Comparative Exercise Physiology 14 Supplement 1*].

Ten horses served as controls. Of the 10 that received omeprazole treatment, eight were dosed at 4 mg/kg and two

were dosed at 2 mg/kg. Median treatment duration was seven weeks. Blood and urine were sampled for serum electrolyte concentrations and urinary fractional excretion before exercise. All the horses underwent a standardized exercise test on the track, and cardiac rhythms were recorded with ECG.

Of the 20 horses, arrhythmias occurred in 15 (75%) during and after strenuous exercise. Six horses had premature depolarizations; nine had more complex rhythm abnormalities. Of the omeprazole group, 90% experienced arrhythmias compared to 60% of the control group. However, there was no significant difference between the groups during or after strenuous exercise, according to the study. No differences were identified in electrolyte concentrations or urinary fractional excretion.

The researchers conclude: “No evidence was found of an increased risk of electrolyte imbalance or arrhythmia prevalence in association with omeprazole usage.”

Rehabilitation Modalities Used for Equine Athletes

Horse owners are motivated to provide the best in care for their athletic partners and often elect to integrate rehabilitation modalities into their management strategies. Researchers at Oregon State University sent out a questionnaire to eight veterinary groups in more than 10 geographic regions. The survey included questions regarding 38 different modalities [Wilson, J.; McKenzie, E.; Duesterdieck-Zellmer, K. International survey of veterinarians using rehabilitation modalities in horses. Carlson College of Veterinary Medicine, Oregon State University. *Comparative Exercise Physiology 14 Supplement 1*].

Private equine practice or referral hospitals comprised 76% of the 305 responses; university hospitals and clinics made up 14%; private mixed

practice contributed 8%; and 2% of responses came from veterinary rehabilitation centers. The USA represented 60% of responses, Europe 26% and Canada 6%.

The type of sporthorse pursuits covered 27% hunter/jumper, 16% dressage and 15% pleasure riding. Horse breeds were mostly warmbloods (40%), with 20% Thoroughbreds and 17% Quarter Horses.

Of the 38 rehabilitation modalities listed on the questionnaire, the respondents cited use of the following in equine cases:

- Hand walking in 97%
- Therapeutic shoeing in 96%
- Ice therapy in 95%
- Compression bandaging in 90%
- PRP injection in 87%
- Therapeutic exercise in 84%
- IRAP in 81%
- Stretching in 83%
- Cold water hydrotherapy in 83%
- Heat therapy in 78%
- Massage in 69%
- Acupuncture in 68%

Electrophysical therapy was used primarily for tendon and ligament injuries, as were injectable modalities. Soft tissue treatments were applied to neck or back injuries, or for muscle strain. Injectable joint treatment was also commonly used following arthroscopic surgery. The respondents consulted with other physical therapists—massage, chiropractic, taping—about a third of the time.

Take-Home Message

There still is a lot to learn about the athletic, competitive horse and how to keep it healthy and happy at work. Sports medicine can range from preventive care to medications to modalities. Keeping up with various research studies conducted around the world is difficult, but hopefully this handful of reports can help you help your patients and their owners. **EM**

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Forage should be the basis of all horses' diets.

Nutrition for the Performance Horse

Veterinarians can help horse owners learn the basics of equine nutrition and feeding to enhance a performance horse's competitive abilities.

Brought to you by 

By Katie Navarra

Google the phrase “daily nutrition needs for people” and a standard answer pops up—2,000 calories per day for the average person. Weight loss, physical training, age and health conditions might mean cutting back or increasing intake to maintain a healthy status. Apps, personal trainers and nutritionists can offer insights into custom tailoring daily

diets to match a person's lifestyle.

Building a horse's diet—especially for a hard-working performance horse—follows the same principles. As physical fitness improves and activity increases, more nutrients are needed to fuel the horse's body. However, the adage “if a little is good, more is better” does not necessarily apply to feeding horses. Accurately understanding the animals' workload is key.

Laurie Lawrence, PhD, a professor of equine nutrition at the University of Kentucky, has observed many horse owners and trainers overestimate the amount of work their horses perform. As a result, many horses are over-fed calories and other nutrients. Except for elite race and competition horses, most performance horses are not performing what the National Research Council (NRC) describes as heavy or very heavy



Demands of exercise are a stressor for the performance horse. Reactive oxygen species (ROS) such as free radicals are produced in the muscles during exercise. Heavy work can overwhelm the body's natural ability to deal with ROS resulting in oxidative stress which can damage muscle proteins, lipids, and DNA, release pro-inflammatory cytokines leading to muscle pain, and damage the mitochondrial membrane thus decreasing energy production.



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Racehorses and elite athletes in endurance or three-day eventing are classified by NRC as being in 'heavy' work.

work, Lawrence stated.

The NRC defines light exercise as one to three hours a week, limited to walking and trotting. Many recreational horses fall into this category. As exercise increases to three to five hours per week, it is described as moderate. The workouts are mostly trotting with some walking, some cantering and possibly some jumping or other type of more difficult activity. Ranch horses, show horses and trail riding horses frequently fall into this category. Racehorses and elite athletes in endurance or three-day eventing are classified as being in heavy work.

Another misperception Lawrence has heard is that commercially manufactured feeds do not provide adequate minerals and that supplements are needed.

"Other than electrolytes, additional supplementation of minerals is rarely needed if a horse is getting at least four to five pounds per day of a feed formulated for performance horses in addition to good-quality forage," she said.

Energy Needs of Horses

The biggest challenge in designing a horse's diet is deciding just how much energy is needed, said Bob Coleman, PhD, PAS, an associate professor and

an equine extension specialist at the University of Kentucky.

"In general, you need to consider the horse's maintenance needs," he said. "Then add in the energy required for the work being done. You might possibly be adding in, or at least considering, additional energy needs a horse may experience during travel."

Lawrence and Coleman point to the "NRC for Horses 2007" as a guideline for counseling clients with nutrition questions for their performance horses. The tool calculates feeding recommendations based on a combination of forages and concentrates to meet that horse's energy requirements. The weights are in metric, so you might need some mathematical adjustments. For reference, each kilogram equals 2.2 pounds.

"Horse owners need to think about the horses they are feeding and maybe not worry too much about comparing their horses to other classes of horses," he said.

Nutrient Needs

All horses, regardless of breed or discipline, require the same nutrients. Calories, crude protein, minerals and vitamins support overall wellness. The differences between horses arise based

on the activity each horse is performing

"The nutrient requirements do not vary across disciplines, but how we might meet those requirements can change," Coleman said. "What we are going to use to provide the calorie needs of the performance horse might be different based on the length and intensity of the activity."

For example, an endurance horse benefits from a diet with more digestible fiber and some added fat. Horses expected to engage in intensive sprinting activities, cutting, racing and other speed events could use readily available starch in their diet to fuel the fast-twitch muscle movements.

A three-day event horse must have the nutrients to support both. The dressage phase includes a degree of intensity, but less so than the cross-country phase, which can burn through stored energy reserves. The challenging stadium jumping phase after cross-country leaves little time to replenish those reserves.

"Nutrition comes down to understanding the metabolism of the various energy sources in relation to the activity being performed," Coleman said. "Another good example is a cutting horse at a major event where there can be multiple go-rounds over a number of days. We need to consider the energy needs so that when we hit the finals, there is gas in the tank."

Hold the Starch, Add the Fat

Throughout the last 20 years, there has been a growing reluctance to use feeds with soluble carbohydrates. Researchers have proven that starches can aggravate muscle conditions such as the "tying-up" caused by polysaccharide storage myopathy. Scientists also have linked dietary sugar and starch with colic, laminitis, obesity and insulin resistance.

But starch has an important place in a horse's diet, especially a high-performance horse engaged in short bursts of high-intensity, anaerobic activity.

Muscles need glucose—which comes from starch—to fuel short, intense bursts of activity. Nutrition in the form of fats and carbohydrates (sugars and starches) is the fuel that sustains performance. However, the horse's body uses these energy sources differently depending on a workout's duration and intensity.

Take aerobic exercise, for instance: During this longer-lasting, lower-intensity work, the muscle tissues use oxygen to convert fat into energy. During the short bursts of high-intensity training that occur during anaerobic exercise, muscles don't need oxygen to convert stored sugars into energy.

Oats, corn and other cereal grains are typically the easiest way to feed some starch. As horse owners shun starch, they are increasing fats. Fat is a useful calorie source, but because different fatty acids have different functions in the body, it is important to think about the type of fat as well as the amount, according to Lawrence.

"There needs to be more research on the effect of high-fat diets on the potential for oxidative damage to muscles and other tissues during various types of exercise," she said.

The important thing to remember is that every horse is an individual, and you must provide him with the fuel sources that best support his metabolism and the type and level of exercise.

"As Dr. Pete Gibbs wrote many years ago: Feed for the ride, then ride for the feed," Coleman said. "We need to use feedstuffs that provide what the horse requires. Feed for the activity, then do the activity."

Performance Horse Nutrition Help

Many horse owners might not understand what their horses require in their diets. They look at feeds without understanding what they provide to the horse and what the reaction might be.



ARND BRONKHORST PHOTOGRAPHY

Not all athletes should be fed the same. For example, endurance horses benefit from a diet with more digestible fiber and added fat.

When you feed the required calories, the horse might be a little energetic, which is what you might expect, explained Coleman. The worry becomes that the horse is "fresh." Your goal is to help clients design a diet that meets the horse's nutritional requirements without overindulging.

"Encourage owners to use feeds appropriately," he said. "There is no quick fix, and we need to be attentive to the needs of the horse. Luckily, we can use a wide variety of feeds to meet requirements."

Lawrence suggested having a discussion about the horse's body condition relative to his job as a starting place. Most performance horses have body condition scores between 4 and 6. Excess weight is a detriment to athletes that run and jump. On the other hand, weight loss or low weight can impact power and speed. Endurance horses are usually in the 4 to 5 range, while hunters and jumpers are more likely to be in the 5 to 6 range.

"If horses are outside of the desired range, then the conversation needs to focus on calorie sources and selection of appropriate hay and concentrate," Lawrence said. "After body condition, the two other topics that would be on my nutrition list for performance horses are

feed quality and feeding management."

In terms of feeding management, discussion of concentrate meal size and feeding frequency might be appropriate for horses receiving large amounts of concentrate.

Smaller, more frequent meals are usually preferred to large, infrequent meals. Manipulating the feeding management before, during or after a competition can also be appropriate for some horses.

The selection of clean, dustless and mold-free forage is essential for performance horses that need to move a lot of air efficiently.

People often forget that water is a nutrient, and a critical one at that. Hydrating a horse after exercise is key.

Take-Home Message

Regardless of the discipline, the key to developing a nutritional program for a high-performance equine athlete doing short, intense work is to remember that each horse is an individual.

It's easy for horse owners to get caught up in following the feeding regimen that the top rider in their sport is using. However, if you look at the Top 10 of any event, they all feed something different. It's all about what the rider wants and what works best for that individual horse. **EM**



How can you attract and keep clients with whom you are happy to work, day in and day out?

Cultivating a Clientele You Love

Continually striving to attract clients who positively contribute to job satisfaction and practice success is essential to veterinarian well-being.

By Colleen Best, DVM, PhD

Dealing with clients can be one of the most rewarding aspects of the day in equine practice, but it can also be one of the most stressful. The objective of this article is to stimulate thought regarding how to attract and keep clients with whom you are happy to work, day in and day out.

The nature of equine practice dictates that we see our clients with a greater frequency than our small animal counterparts. Further, we often work more in-

dependently than those in small animal practice. This adds to the importance of ensuring that we are enjoying working with the majority of clients we see in a given day.

A misperception is that cultivating a clientele is what happens as one starts his or her practice or establishes it. I believe this mentality does not serve us well over time. For various reasons, there is always turnover of clients. As such, continually striving to attract clients who positively contribute to job satisfaction and practice success is essential.

Further, the financial security of the practice or our positions is often contingent on the number of clients we see. Therefore, it can be unrealistic to decline to see a paying client who is tolerable simply because we find that person challenging to work with. That being said, hopefully, over time, we can shift our client list from those who chose us to one filled with clients we enjoy working with, having weeded out those that we find draining or unrewarding.

For most veterinarians, firing clients is not common practice (and might involve

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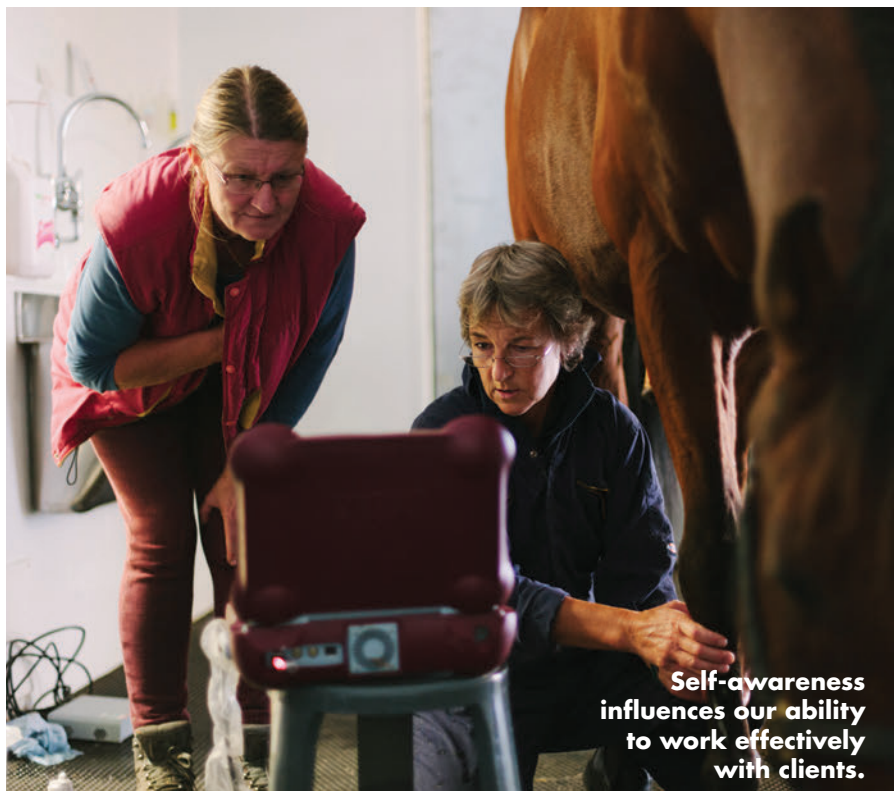
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**Self-awareness
influences our ability
to work effectively
with clients.**

some paperwork), but it is a tool each of us should remember we have in our back pockets.

Self-Awareness

A fundamental component of cultivating a clientele is having good self-awareness, which is to say knowledge of ourselves, what our likes and dislikes are, what gives us energy, what our values are and so on. Self-awareness is one of the five pillars of emotional intelligence; however, its impact stems far beyond simply emotional intelligence.

Self-awareness can be used to guide our decisions and actions. Considering the answers to the following questions is helpful in providing a baseline self-awareness relating to our practices:

- What are your strengths?
- What activities do you find to be energy-giving and energy-depleting?
- What do you find to be rewarding in practice?
- What do you financially need from your job? and
- What do you need to have space for in your personal life outside of practice?

When we use our awareness of our needs and ourselves as a component of how we make decisions, we are more likely to make decisions that align with our values and that will lead to fulfillment in the future. This is generally referred to as living in alignment with your values. This is likely to allow for longevity in practice and satisfaction.

Self-awareness also influences our ability to work effectively with clients. When we are practicing or living outside of alignment with our values, we are less likely to be able to form and sustain strong relationships. Further, if we are aware of what our values are and live those out daily, we can attract clients who allow us to do this and who might even share our values.

When we have clients whose beliefs about animal care, their roles as pet or competition partners, and so on, are vastly different than our own, we are likely to encounter conflict and ethical dilemmas regularly. For those reasons, it is essential that we know what is important to us and strive to work with those who share, or at least respect, those things.

Setting Boundaries

Setting boundaries is a critical piece of having a clientele who respect your time and with whom you enjoy working. In part, this is because when we set and maintain appropriate boundaries, we have enough time outside of work to regenerate. In turn, this allows us to return to practice refreshed and ready to face the stresses and challenges of any given work day.

The first step in setting boundaries is in deciding what they are! What rules do you need to put in place to protect your privacy, your personal time and your sense of self?

When we do not set boundaries or we fail to enforce them, we often experience negative consequences, including anger, frustration, resentment, exhaustion and so on. Communication of our boundaries to others necessitates that we are assertive. This is easier to do proactively as opposed to reactively.

For instance, it is easier to inform a client that you don't respond to non-emergency-related text messages in the evenings, rather than have to decide how to respond when the situation arises. I use this as an example because I recognize how our society's constant connectedness can be incredibly difficult to manage, and it can seem inescapable.

Setting limits on how available you are, while ensuring that there is someone else to meet the needs of the client if there is a valid problem, can be a delicate balance. However, once found, it can be incredibly rewarding.

While setting and maintaining boundaries can seem selfish, those boundaries protect our ability to care for our clients and patients on an ongoing basis. For the most part, when we set and enforce realistic boundaries, other people learn to adapt and accept them.

Client Relationships

To this point, this article has primarily discussed internal factors that help position us to cultivate a clientele that supports our passion for practice. Having



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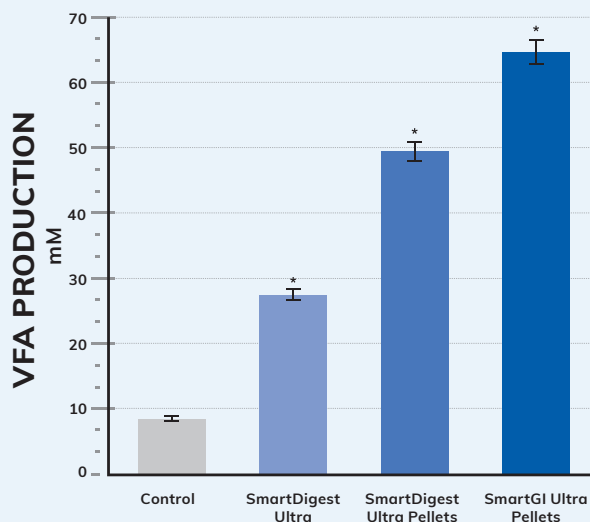
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Having strong relationships with our clients is crucial to enjoying our time in practice.

strong relationships with our clients is another crucial factor in enjoying one's time in practice.

Companion animal research demonstrates that the quality of our relationships with clients impacts veterinary job satisfaction.¹

Each of us is likely to have a different type of ideal relationship with our clients. However, the veterinary literature does highlight some factors that contribute to what is generally considered to be a strong veterinarian-client relationship, including communication² and empathy.¹

This is reinforced by a study of equine clients who found veterinarian-client communication to be the fourth-highest expectation clients hold of veterinarians; the first three were competence, animal handling and doctor performance.³

Recognizing what each party wants out of a relationship, and what his or her expectations are, is a key component in being able to determine whether this is a relationship worth pursuing. Then each party has to decide how to facilitate relationship development.

A key component of relationship building in any setting is exchanging information. For us in equine practice,

this information can be of both a medicine-related and personal experience nature.

The nature of equine medicine necessitates that we learn quite a bit of information from and about our clients—what they do with their horses, how their horses are managed, what they know about their horses' health, and so on.

The frequency with which we interact with our clients commonly means that we learn quite a bit about our clients' lives. We also give our clients lots of information along the way. We provide them information about their horses' well-being, offer suggestions to help support performance and advise on management issues.

Clients accumulate the information that we have shared with them over the years, and hopefully they become more capable and competent horse owners. The investment we have made in our clients by sharing our knowledge and experience has a very valuable return on investment as they are easier to work with and are more likely to adhere to our recommendations!

A fundamental piece of exchanging information is that the other party

receives it; this necessitates listening to the client. It can be difficult to find time to spend with clients who like to talk or seem to want to share unrelated pieces of information with us. However, when we are able to take the time to listen, the information gained can help us engage with them effectively, build relationships and communicate clearly.

Reputation Management

One aspect of cultivating a clientele that is often ignored is managing one's reputation. Larry Winget was the keynote speaker at an AAEP Convention a number of years ago. He wrote a book entitled "Shut up, Stop Whining and Get a Life." One of the things that stayed with me throughout the years from his talk was that when we complain or are negative most of the time, that is how people see us.

It behooves all of us to consider what we are putting out in the world, because that is often what people respond to.

When we treat others with respect, we are more likely to be treated with respect in return. The equine world is a small one, and referrals or endorsements from professionals can be a great way to gain good clients.

Take-Home Message

Intentionally cultivating a clientele with whom you enjoy working is likely to have impact that reaches beyond your enjoyment in practice. The result is worth the energy and time it takes. **EM**

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The Scoop From the Schools

Make sure you check out this monthly blog on EquiManagement.com.

The Scoop From the Schools is a digital blog that brings news and information from vet schools and equine research facilities to those involved in the equine veterinary industry. In this article, we feature news from the blog featuring Texas Tech University School of Veterinary Medicine and Oklahoma State University.

Welcome, Texas Tech University School of Veterinary Medicine

After more than 50 years of dreaming, planning and probably wearing out a lot of shoe leather in support of the school, 64 students christened the hallowed halls of the brand-new Texas Tech University School of Veterinary Medicine (TTU SVM) on August 9 and began school on August 16.

“Our efforts finally came to fruition because of the incredible leadership, vision and teamwork of so many across Texas Tech, Amarillo, communities

across West Texas, the veterinary profession, and among elected officials,” said Weston Brooks, TTU SVM’s director of communications and marketing. “The Amarillo Economic Development Corporation and private donors played hugely significant roles in making the SVM a success.”

TTU SVM has two campuses: Amarillo Campus and Mariposa Station. Amarillo Campus is the academic headquarters, divided into east and west wings. The east wing houses the faculty, staff, classrooms, etc., while the west wing houses the teaching and research laboratories. Students receive hands-on instruction with all domestic livestock, including equines, at Mariposa Station.

The school’s curriculum focuses on general veterinary practice in rural and regional communities. According to Brooks, “We have upended the usual model by substantially decreasing classroom time and dramatically increasing



the time developing clinical and professional skills. We are focused on practitioner-identified competencies and a program that builds confidence in their competencies. In other words, practice until we get it right, and then practice some more so we can’t get it wrong.”

TTU SVM was granted Provisional Accreditation by the American Veterinary Medical Association (AVMA) Council on Education (COE) in March 2021. This status means those who graduate from the program will receive the same privileges as students who graduate from a fully accredited program. The TTU SVM will be eligible to apply for full accreditation in the spring of 2025.

Cozy Up to Your Hay Producer!

Planning on buying your horses hay this winter? Better get on it! Oklahoma State warns agriculturalists—including the equine industry—about this year’s anticipated hay shortage. Veterinarians can warn their clients of this potential hay shortage in many areas of the country due to either drought or excessive rains, while re-emphasizing that forage is the basis of all equine diets. (*Editor’s note: You can also check out or share a snapshot of USDA hay prices in various states from HayandForage.com.*)

How short is the shortfall? In the event of this anticipated shortfall, expect hay prices to go up 20% or more. “If you have a large number of horses, that can be significant,” said Kris Hiney, PhD, Oklahoma State University equine extension specialist and associate professor.

If your clients are getting nervous about finding sufficient forage to last until spring, Hiney suggested bagged forages, cubes and pellets as alternatives. She did warn, however, that as processing increases, so does the price.

One of the best ways to secure hay earlier in the season is by having a good relationship with your hay supplier. “There is something to be said for customer loyalty. Overall my advice is to secure your hay now, and expect to pay more!” Hiney said. **EM**



THE BALANCE OF PASSION AND PRACTICE

Equine veterinarians can balance a passion for equine care and financial best practices for a more harmonious and successful work/life balance.

By Kimberly S. Brown

All veterinarians struggle to find the right balance between their love of equine practice and developing the right boundaries to give themselves a more harmonious work/life balance. Amy Grice, DVM, MBA, said that veterinarians are “helpers. We’re there to serve. And bringing money into it sort of dirties it or sullies this feeling of helping.”

So how can the industry provide a career in equine veterinary medicine that provides this balance, thus attracting the brightest, most passionate vet school graduates to the profession? A culture shift is underway that hopefully will provide a career and lifestyle that means a long, happy life as an equine veterinarian.

TODAY'S PAIN POINTS

One of the first issues is that veterinarians must understand they are small business owners. The business side of equine veterinary practice—especially for solo ambulatory veterinarians or smaller practices—is hard for many individuals. They went to school to care for animals, not study spreadsheets.

But, without a good business foundation, today's equine practices can't afford to give tomorrow's veterinarians the lifestyles they want.

There is a crisis playing out in the profession. Grice recently highlighted evidence of this crisis with these facts:

- Throughout 2021, about 500 equine veterinary associate positions have consistently been available in the country.
- Only about 40 vet school graduates enter equine practice each year, while about 60 older practice owners retire.
- Equine practitioners have a career and lifestyle that means about half of graduating veterinarians who do enter equine practice leave in the first five years.

Without some major shifts in entrenched culture, the future of equine practice is in jeopardy, according to Grice and others. But they say a culture shift is within reach. If veterinarians learn to value themselves and their services, take proactive steps



toward financial health, and address the lifestyle issues that contribute to stress and dissatisfaction, they can turn the tide.

“We have the capability to have a positive future. We just have to create new paradigms in equine practice,” said Grice.

HELP FOR THE ‘HELPERS’

CareCredit, a financing solution for veterinary clients, recently convened a roundtable of experts for a discussion of the current industry and what has and should change. In this article, we will share highlights from the panelists’ comments. A longer article will appear on EquiManagement.com that will offer additional insights, personal experiences and practice tips from roundtable participants that can help practices improve their financial relationships with clients, resulting in less stress

for equine veterinarians.

The panelists were: **Grice**, who practiced for more than 20 years before starting Veterinary Business Consulting. She is the AAEP Treasurer until 2023 and is a member of the AVMA Economic Strategy Committee. **Charlotte Hansen, MS**, is the assistant director of statistical analysis at the AVMA in the Veterinary Economics Division. She specializes in equine economics and geospatial analysis. **Wendy Krebs, DVM**, is a partner and co-owner at Bend Equine Medical Center in Oregon, where she focuses on equine surgery, performance horse sports medicine, internal medicine and comprehensive preventive care. **Kyle Palmer, CVT**, manages VCA Salem Animal Hospital in Oregon. During his 29 years in the veterinary field he has been manager of a mixed equine and companion animal practice, executive

director of Northwest Equine Practitioners Association, a consultant, and an author in veterinary management magazines. **Kelly Zeytoonian, DVM, MBA**, is the owner of Starwood Equine Veterinary Service and Starwood Veterinary Consulting in California. Zeytoonian serves on the Board of Directors of the Northern California Association of Equine Practitioners.

THE IMPORTANCE OF GETTING PAID AT TIME OF SERVICE

One critical point that came from the roundtable discussion was that small animal veterinary professionals have adopted the practice of getting paid at time of service, while their equine counterparts have struggled to do so. Small animal practices also are more likely to help clients understand financial preparedness and offer financing options.

About 15 years ago, Krebs’ practice decided to change its protocol to getting paid at time of service. They knew they would have to continue to deal with absentee owners and clients who forgot their credit card or checkbook, but they made an expectation for immediate payment their default.

“You start to train your clients on that expectation [getting paid at time of service], and you start to train your support staff that they need to get that credit card number on file or make other

arrangements for payment when they make the appointment, and things eventually start to fall into place,” she said. “I think it’s a change of mindset.”

Krebs said equine veterinarians currently feel that “it’s rude to talk about money” or “we’re going to make the clients uncomfortable talking money” when it’s really the opposite. “We’re going to make them uncomfortable if they don’t know how much they’re going to spend.”

A mantra Krebs tries to live by comes from equine practice management expert Andy Clark, DVM, MBA: “You should never surprise the client,” she said. “You should not surprise them when you ask them for payment at the time of service, and you should not surprise them with an invoice they’re not prepared for.”

This means it’s essential to communicate about financial preparedness when the appointment is made. Krebs’ customer service team is trained to ask, “How do you plan to pay today?” or, better yet, “Do you have a credit card we can keep on file?”

“Our equine vets are not the best at waiting around; they might be trying to get to another emergency,” Krebs said. But if they know there’s a credit card on file and say to the client, “We’ll just put those charges on the card you have on file, right?” 95% of the time the client will agree.

Zeytoonian's practice has a policy in place that payment must be arranged before a veterinarian will go out on a weekend or see a new client. "They say, 'Once I see that the email [about payment] come through with the paperwork, then we can get something on the schedule,'" she said. "That has been super helpful for our team."

IT'S MORE THAN JUST MONEY

For equine practice owners, living month to month and wondering how to pay the next bill is a source of constant anxiety, Palmer said. "I think, by and large, most veterinarians would love to pay their staffs more," he said. "I don't think enough veterinarians understand how vital it is and that they are undercharging chronically and undercollecting regularly. Those two things really cause waves of stress that go throughout the practice."

When associates are not able to get paid because of client nonpayment and underpayment, it makes their already stressful lives even more challenging, he continued. "It makes it difficult to stay in a job. It makes it difficult to stay in this industry," Palmer said.

Grice agreed. "It starts to feel for people like they're sacrificing their life on the altar of veterinary medicine," she said. "They see their friends or people outside of

veterinary medicine having a normal life. And they feel trapped in this thing that they love but that is eating them alive."

Finding a way out that doesn't entail leaving the profession involves some deep soul-searching. "Equine practitioners need to embrace the value that they provide and feel confident in charging appropriately for what they do," Grice summarized.

TAKE-HOME MESSAGE

Business, money, life, stress ... they are all tied together for equine veterinarians. And some horse owners add to that stress with demoralizing statements about the cost of services or by not paying for services rendered. But several roundtable participants have learned to create healthy emotional and financial boundaries in their practices. Krebs said, "As I mature, I just don't let them [clients] put that financial stress on me. I am there to help them to the best of my capability and within their resources, but it does not fall on my shoulders to enable them financially."

This doesn't mean she doesn't show compassion. "I absolutely acknowledge to them the stress of the situation that they're under," she continued. "I acknowledge that it's expensive, and I'm empathetic. I can help provide solutions that are within their means. But that does not



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mean that I need to be the one that subsidizes their animal's health care."

Zeytoonian expounded by saying, "My job is to provide you [the client] with all of the options for care and give you a path to health and wellness for your horse. And my job is also to educate you on insurance opportunities and payment options—none of which involve the practice of putting somebody on a payment plan or subsidizing the care of the animals."

The panelists were in agreement that building a personal relationship with clients is key to financial discussions. "With the relationship, then the transactional part becomes so much easier," said Grice.

"When the client knows what to expect financially from the beginning of the relationship and they have a plan for payment, ... that allows the veterinarian and the horse owner to be on

the same team," concluded Grice. "Then they can both just concentrate on caring for the horse, which at the end of the day is what veterinarians really want to do."

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Even 'minor' flooding can result in water invading unexpected places.

Veterinary Involvement in Equine Flood Rescue

Planning and participation in rescue and treatment of horses affected by flooding all are touchpoints for equine veterinarians.

By Nancy S. Loving, DVM

Rebbecca Gimenez-Husted, PhD, stressed the importance of an evacuation plan when discussing how to reduce the impact of floods on horse health and safety. This is best accomplished when tied in with disaster and emergency planning for a local area.

Veterinarians in disaster-prone areas should reach out to emergency managers to discuss these topics in advance of a crisis. Emergency managers usually focus on human evacuation, but alerting them to the importance of managing animal evacuation and rescue also helps with human evacuation, since many people won't leave pets and horses behind.

Above all, lessons learned from a disaster can improve strategies for the next time. For example, horse owners can be apprised of safe first aid treatment options to administer before help arrives. Good planning and availability of resources can help dispel owner fears.

Flood mapping identifies areas of higher ground—much of this information is available online and should be accessed before cell towers and internet services go down in the midst of flood conditions. Ideally, when faced with the prospect of an oncoming natural disaster, owners will evacuate animals early or find a safe area to shelter them in place. Even a “minor” flood stage results

in water invading unexpected places. Horse trailers should also be moved out of flood-prone areas so they are available when the need arises.

Husted noted that animals with access to high ground will usually try to get there. (In the Colorado Flood of 2013, as I evacuated and surveyed the debacle below me from a high vantage point, I was impressed by the number of bull snakes that had made it up the hill behind our home. They were exhausted by their climb, but they did narrowly escape the deluge.)

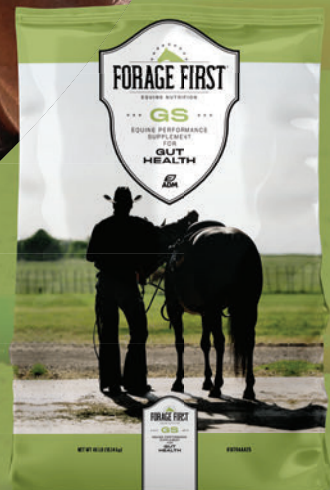
Owners should be cognizant of fences, barbed wire and tree lines that might impede a horse's ability to flee. In



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Owners should be cognizant of fences that could impede a horse's escape.

advance of a crisis, veterinarians might need to converse with clients about providing access to raised areas—such as arenas or round pens—where horses can safely shelter in place without being inundated by flood water. Feed, water and treatment can be brought to horses trapped on high ground until flood water recedes.

When trying to save or move animals involved in a flood, it's critical to know what else is in the water, with special awareness of what is upstream. Waste treatment plants, oil or chemical plants, forests and rock debris, and venomous snakes are just a few conditions that potentially are dangerous not just to horses, but to people involved in their rescue. It is best to keep people and small animals out of potentially toxic and hazardous flood waters.

Veterinarians can encourage horse owners to ensure that their horses are able to lead, load, tie and be handled safely in case of any emergency. The horses should be up to date on immunizations (including tetanus) and deworming, because it is likely that they'll be going into group housing situations when evacuated.

Husted stressed that while horse owners might try to lead a horse behind a water vessel, they might not realize that horses float high in the water because of air in the lungs and intestines. However, their legs dangle down in the water for many feet and can become entangled in debris, with ensuing injuries. Of similar importance is the difficulty that horses have holding their heads above water. Because the nose tends to dive downward, there is a need to help the horse hold his nose up by safely securing the head to a stable object such as the side of a boat or rigid structure while extricating him from flood waters.

People attempting to rescue horses from flood waters should be clothed in appropriate PPE, helmets and personal floatation devices (PFD). Husted noted that waders might seem like a good idea, but if water fills them up, a person could go under and drown.

Veterinary Treatment of Horses in Floods

Louisiana has had multiple flood and hurricane disasters in recent years, with 2020 affected by six significant hurricanes and intense flooding situations.

Rebecca McConnico, DVM, PhD, DACVIM, of Louisiana Tech University, described how core competencies are important for veterinarians assisting horses through any disaster.

In addition to good communication skills, equine veterinarians should be familiar with:

- Euthanasia techniques
- Biosecurity strategies
- Hazardous materials and decontamination
- Animal issues related to evacuation and shelter
- Critical incident debriefing
- Knowledge of dealing with personal and business continuity, as for example providing alternative emergency services, teaching or business management if a veterinarian's business is disrupted during a crisis
- Working with first responders
- Animal triage and first aid

When possible, certified responder training is invaluable—large animal technical techniques and rope strategies, emergency rescue and slack water rescue.

Triage might need to happen in the field, via a mobile veterinary unit, or in

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a hospital environment. While assessing the situation, consider whether the animals need to be moved if they can't be safely managed on site, and if so, where can they be moved? How will they get there? A plan should be put in place for appropriate restraint, safety measures and triage with medical supplies and experienced veterinary personnel and handlers.

In many cases, there might be transport difficulties for large numbers of animals as well as limited veterinary medical resources of facilities, equipment, supplies and personnel, especially with 24-hour emergency capabilities. There is also the challenge of managing limitations of a horse owner's disposable income for treatment. In the USA, collaboration with the American Association of Equine Practitioners (AAEP) is possible to access strategies that have been set up to coordinate resources and donations for large-scale disasters.

McConnico pointed out that part of a practitioner's medical approach relies on a physical exam that includes respiratory rate, pulse rate, pulse pressure, mucous membrane color, limb temperature and neurologic status. She noted that horses often aspirate sludge when they struggle in flood conditions, leading to aspiration pneumonia.

Proper identification of each horse is accomplished ideally with two forms of ID: a microchip (or tattoo) and a temporary ID tag. Color-coded ribbons help with triage—black for individuals that are likely to die no matter the treatment, green for horses likely to survive no matter what, and red for those animals that will benefit from medical intervention. Cattle tags seem to last the longest as temporary ID and can be written on with a permanent marker. A horse's wounds, fractures or burn injuries should be marked down, along with its

behavioral disposition, especially if it is an aggressive animal.

McConnico described the standard protocol used by her clinic for "water line" horses with cellulitis and dermatitis. These are horses that have been standing in flood waters up to at least their belly for a period of days:

- Triage of evaluation physical exam
- Decontamination of body and limbs—Dawn soap or Miconahex/Triz or Simple Green
- Daily hydrotherapy
- No limb bandages are applied unless there is septic tendonitis—McConnico noted that this simplifies care of many animals at once; so for a small number of horses, this can be modified.



- Topical silver sulfadiazine
- Systemic NSAIDs
- Systemic broad-spectrum antibiotics, especially important for respiratory conditions and wounds
- Systemic fluconazole to combat potential fungal infections common to time spent in water. (One type of infection—Pythium, an aquatic fungus—is not responsive to standard antifungal treatment.)

The Miconahex/Triz treatment has several advantages: Triz EDTA opens up bacterial cell walls by chelation and allows antimicrobial drugs to enter the cells to improve the efficacy of chlorhexidine and miconazole. Also included in this treatment product is ceramide,

which moisturizes, heals and restores the skin barrier.

Horses that aren't responding to treatment should be reassessed and either re-treated and observed or euthanized, said McConnico. Many cases of respiratory conditions warrant euthanasia due to aspiration pneumonia or pleuropneumonia. Horses involved in natural disasters might also experience head or neck trauma, fungal infection of the CNS and botulism. For any case of euthanasia, especially where an owner is not available for permission, the decision must be well-documented with accurate medical support of this humane act. It is a good idea to have more than one person attest to and document the reasons for this decision.

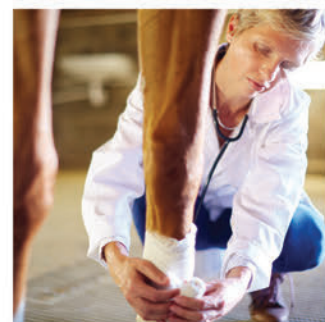
Husted relayed another feature an equine veterinarian can help address: information regarding carcass management and disposal following a disaster, especially if such arrangements are identified in advance of the event.

McConnico noted that in some cases, there are PR issues due to television cameras. So as ambassadors to the animals, it is good for veterinarians to be sensitive to how actions taken in the time of duress will look to the outside world.

Take-Home Message

Veterinarians play a key role in educating horse owners before any disaster strikes and working with regional emergency managers for disaster preparedness.

Large animal rescue training will serve your practice well if you are located in flood-prone areas. There are legal and ethical considerations when horses are being handled and treated without owners present during disasters, and often the eyes of the world are on you as you lead the health care team to help these horses. **EM**



Dr. Kami Vickerman, Pioneer Equine Animal Hospital, Oakdale, CA

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Take control of joint and lameness issues

With a new non-surgical, non-drug treatment, horses may enjoy a better quality of life and remain active longer.



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

Limitations of current treatments

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

Along with inconsistent results and the inability to stop disease progression, each of these therapies carries with it unique drawbacks. Lameness issues are chronic and require ongoing treatment. Long-term use of NSAIDs comes with potential serious side effects, including the risk of ulcers, kidney damage and colic. And while corticosteroid injections are

well documented to alleviate pain, overuse of certain steroids may actually be further damaging to the joint they're attempting to protect.

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

Introducing Spryng™ with OsteoCushion™ Technology: a new first line of defense

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

When injected into the joint, Spryng creates a sponge-like, shock-absorbing matrix — that works with synovial fluid to mimic the protective form and function of natural, healthy joint cartilage. When a horse jumps, runs or performs any movement with joint impact, Spryng absorbs and releases synovial fluid in response, with elastic stiffness that complements natural synovial fluid and cartilage dynamics.

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

An effective injectable device solution

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

Spryng particles are too large to pass through synovial membranes, allowing long duration of their slippery cushion effects to reinforce the joint's articular cartilage and ameliorate or preclude the cartilage defects that cause pain to limit motion. The particles then gradually resorb into the surrounding synovial tissue.

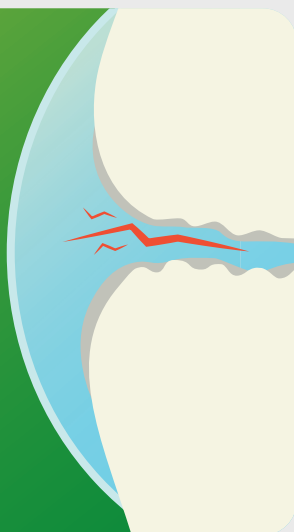
Unlike conventional treatments that require repeated injections or ongoing administration, one Spryng injection may provide relief for more than 12 months, making it an effective and economical solution for treating osteoarthritis, lameness issues and joint-related conditions.

Untreated joint

Chronic joint pain

Inflammation

Progressive degeneration



Joint treated with Spryng™ with OsteoCushion™ Technology intra-articular injection

Spryng gel-particles act as a micro-cushion mass of material that integrate into the synovial fluid and surrounding space to provide a soft, lubricous, elastic cushion.

Spryng is composed of a sponge-like particulate biomaterial produced from naturally derived, purified proteins (collagen and elastin) and one carbohydrate.



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

Relieving joint and lameness issues with Spryng with OsteoCushion Technology

Without negative side effects

While some intra-articular injectables present serious drawbacks, Spryng with OsteoCushion Technology is a naturally-derived biomaterial. It has an excellent safety profile demonstrated in humans, laboratory animals, horses and dogs. In fact, in more than five years of case studies there have been no adverse effects observed or reported other than some mild, short-term injection site responses.

Addressing lameness issues, not masking symptoms

After a Spryng with OsteoCushion Technology injection, in many cases, study animals no longer needed NSAIDs for pain relief and were able to return to normal activity levels. Improved motion also improves blood flow and oxygen to the treated joint to promote a healthy metabolism of the joint's fluid, membrane and cartilage. This contributes

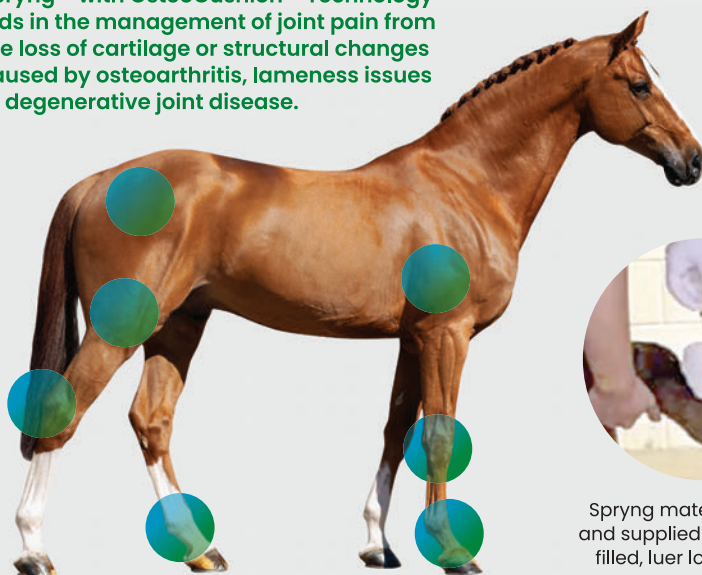
to reducing inflammation, greater joint health and a slowing of the progression of lameness issues, joint degeneration and osteoarthritis.

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

To learn more, visit [SpryngHealth.com](https://sprynghealth.com)

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



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1. Orth MW, Schlueter AE. Equine osteoarthritis: a brief review of the disease and its causes. Equine Comp Exerc Physiol (2004) 1:221-31. doi:10.1079/ecp.2004.28
2. Keegan KG. Evidence-based lameness detection and quantification. Vet Clin North Am Equine Pract (2007) 23:403-23. doi:10.1016/j.cveq.2007.04.008



Main causes of airway dysfunction include exposure to particles of solids or liquid droplets suspended in the air.

Equine Respiratory Disease Protection

There are many ways for veterinarians to help horse owners keep their equine partners safer from respiratory damage.

By Nancy S. Loving, DVM

The coronavirus pandemic has made citizens worldwide acutely aware of some epidemiological facts about how a respiratory virus is spread and methods to curtail transmission. With this new degree of knowledge, horse owners have a better understanding about respiratory disease protection today than in any time in history. As their veterinary medical consultants, you can use that understanding to help them optimize their horses' respiratory health.

Insults on Airway Tissue

A starting point in client education is to improve environmental issues that assault equine airways. Main causes of airway dysfunction include exposure to particles of solids or liquid droplets suspended in the air. There are many such substances: a) inorganic materials such as silica, metals or diesel discharge; b) organic debris from bacterial products, such as animal waste, molds, spores, pollens, insect parts and wildfires; and c) endotoxin (the cell wall of Gram-nega-

tive bacteria) in particle dust.

Horses obviously can't wear face masks, so strategies for airway protection rely on human intervention to minimize circulating particulates in the air. Particulates range from coarse (10 microns) to fine (2.5 microns) in size. (For comparison, a human hair is 60-70 microns thick.) Particles of 5-10 microns that make it past nasal hairs and sneezing get through to irritate nasal and throat tissues. Coughing and the mucociliary escalator eliminate particles

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up to 30 microns, but those that aren't cleared can settle in lower airways, with particles less than 4 microns ending up in alveoli.

An indoor and stall environment have a huge impact on the health of the equine respiratory tract. One study identified that 55% of previously healthy Thoroughbred horses 16-24 months of age developed inflammatory airway disease within three days of arrival at a training barn; by 28 days, only two of 20 horses remained free of airway inflammation. Dusty environments tend to increase airway mucus, which impairs performance.

Mitigating the Impact of Feed Materials

Particulate levels are high indoors, especially during feeding and stall cleaning. This is exacerbated when a barn is closed up in winter. Consumption of dry hay is known to increase dust by 30 to 40 times in the breathing zone air around a horse's nose. Clean hay creates 19.3 $\mu\text{g}/\text{m}^3$ (cubic meters of air) respirable dust in the breathing zone while dusty hay puts out 81 $\mu\text{g}/\text{m}^3$ of respirable particles.

Square or round bales increase airway inflammation compared to pasture. Hay nets and hay racks at head height increase particulate intake compared to feeding on the ground. Horses living outdoors are exposed to relatively small amounts of particulates even when fed the same hay as stabled horses. Although a high-forage diet contributes to equine gastrointestinal health, hay as a source of dust, mold and particulates contributes to airway inflammation. Lower-dust feed such as pellets, quality hay cubes, baked or chopped hay, or fermented haylage greatly reduce dust levels throughout a stall environment.

GETTY IMAGES/ISTOCKPHOTO



Stall environment has a huge impact on the health of the equine respiratory tract.

Mitigating the Impact of Feces and Urine

One critical substance that generates respiratory inflammation is endotoxin, a component of the bacterial cell wall of Gram-negative bacteria found in large quantities in fecal matter, hay, straw and even in horse dander. Endotoxin adheres well to airborne particles. Frequent stall cleaning helps to mitigate endotoxin. Soaking or steaming hay further minimizes dust and respiratory irritants. Offer only as much soaked hay as can be consumed relatively quickly to avoid bacterial growth (and endotoxin) in moist hay.

Ammonia at typical levels in the barn mostly affects a horse's upper airways, although higher concentrations (>500 ppm) cause lower airway inflammation and pulmonary edema. Inflammatory airway conditions from ammonia have multiple adverse effects—an increase in mucus, effects on immune respons-

es, and interference with mucociliary clearance of the airways. A distinct ammonia smell in a stable indicates that it has exceeded the recommended threshold for good-air quality.

Good ventilation in a barn with continuous air changes is important to airway health. Efforts can be taken to minimize dust particulates in stalls that are in proximity to manure handling, fans or foot traffic. Use ample bedding to soak up urine and contain feces. Shredded paper or pelleted bedding has a lower dust content than straw or wood shavings. Interlocking or seamless stall mats prevent urine from seeping into areas inaccessible to absorbents or cleaning. Frequent—once or twice daily—removal of soiled bedding is key to ammonia control.

In addition, feed a lower-protein diet (grass hay rather than legume) to lessen urea content in urine—this reduces ammonia fumes. Stall products (such as Sweet PDZ or Stall Dry) containing diatomaceous earth, clay and zeolites are useful to trap ammonia and absorb moisture.

The Impact of Riding Arena Footing

Indoor arenas pose an additional potential risk by aerosolizing dust and debris to high levels of 60 $\mu\text{g}/\text{m}^3$ as horses move around the arena. Dampened footing holds down particulates. Latex rubber commonly incorporated into arena surfaces provides cushioning to limit musculoskeletal injury, but latex is an allergen recognized as causing equine asthma. It is present not only on artificial training surfaces but also in circulating air in urban environments from wear on car tires, especially if a road is near an arena.



Andy Roberts, DVM
Lexington, KY

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Infectious upper respiratory disease can have significant consequences for horse health. Chest and nasal congestion, wet or dry cough, runny nose and fatigue, can keep your horse down for weeks.

When it comes to respiratory tract infections in horses, there's only one truly effective FDA solution – Equisul-SDT® (Sulfadiazine/Trimethoprim) – the only liquid, fast-acting orally-applied antibiotic approved for horses.

Where Equisul-SDT truly shines is in horse safety, reduced side effects and significantly higher bioavailability of active ingredient. This all translates into quick protection and treatment.

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Get your horse back in the game.

Talk to your veterinarian about Equisul-SDT® – the fastest, most efficient lower respiratory tract antibiotic made specifically for horses.

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EQUISUL-SDT®

(Sulfadiazine/Trimethoprim) Oral Suspension

For use in horses only.

Approved by FDA under NADA # 141-360

CAUTION

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

DESCRIPTION

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

Figure 1. Structure of sulfadiazine

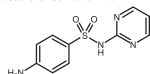
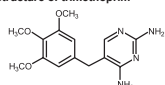


Figure 2. Structure of trimethoprim



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

INDICATION

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

DOSAGE AND ADMINISTRATION

Shake well before use.

Administer EQUISUL-SDT orally at the dosage of 24 mg combined active ingredients per kilogram body weight (10.9 mg/lb) twice daily for 10 days. EQUISUL-SDT can be administered by volume at 2.7 mL per 45.4 kg (2.7 mL/100 lb) body weight.

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

CONTRAINDICATIONS

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

WARNING

Do not use in horses intended for human consumption.

HUMAN WARNINGS

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

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

PRECAUTIONS

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

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

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

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

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

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

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

ADVERSE REACTIONS

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

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

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

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

CLINICAL PHARMACOLOGY

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

Based on a study in fed horses, trimethoprim concentrations following repeat oral administration of 24 mg/kg EQUISUL-SDT to 6 horses reached peak concentration in 0.5 to 12.0 hours. The median plasma elimination half-life was 3 hours, with a range of 2.31 to 4.96 hours. Peak sulfadiazine concentrations were reached within 1.0 to 12.0 hours in the same study. The median plasma elimination half-life of sulfadiazine was approximately 7.30 hours, with a range of 6.78 to 10.39 hours. Only minor accumulation of both drugs was observed following repeat oral administration of EQUISUL-SDT and both drugs reached steady state by day 3. Sulfadiazine and trimethoprim key steady state parameters associated with administration in 6 fed horses over a period of 7 days are found in Table 2.

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

| Drug | Sulfadiazine | Trimethoprim |
|---------------------------------|--------------------------|----------------------|
| Tmax (hr) | 4.75 (1.00–12.00) | 8.50 (0.50–12.00) |
| Cmax (µg/mL) | 17.63 (10.10–31.15) | 0.78 (0.60–1.14) |
| AUC 0–12 (last dose) (hr*µg/mL) | 159.35 (73.90–282.54) | 5.47 (3.31–10.91) |
| T 1/2 (hr) | 7.30 (6.78–10.39) | 3.00 (2.31–4.96) |

MICROBIOLOGY

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

EQUISUL-SDT administered as a combined sulfadiazine-trimethoprim dose of 24 mg/kg body weight twice daily for 7 days provided concentrations of sulfadiazine and trimethoprim with T-MIC90 (%) values of 100% and 98% respectively. The minimum

inhibitory concentration (MIC) values for EQUISUL-SDT against indicated pathogens isolated from lower respiratory tract infections in horses enrolled in a 2010–2011 effectiveness field study are presented in Table 3. All MICs were determined in accordance with the Clinical and Laboratory Standards Institute (CLSI) Approved Standard M31-A3 using a broth microdilution system and 3% lysed horse blood.

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

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

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

EFFECTIVENESS

A negative control, randomized, masked, field study evaluated the effectiveness of EQUISUL-SDT administered at 24 mg/kg body weight, orally, twice daily for 10 days for the treatment of lower respiratory tract infections in horses caused by *Streptococcus equi* subsp. *zooepidemicus*. In this study, a total of 182 horses were treated with EQUISUL-SDT, and 88 horses were treated with saline. One hundred seventy-three horses (112 EQUISUL-SDT and 61 saline) were included in the statistical analysis. Therapeutic success was characterized by absence of fever and no worsening of clinical signs at Day 5 and Day 10, and significant clinical improvement or resolution of clinical signs of lower respiratory tract infection by Day 17. The observed success rates are 58.9% (66/112) and 14.6% (9/61) for the EQUISUL-SDT and saline-treated groups, respectively.

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

Table 4. Overall Clinical Effectiveness Results

| | Equisul-SDT | Saline | P-value* |
|--------------------|-------------|--------|----------|
| Least Square Means | 61% | 13.1% | 0.0123 |

* P-value and estimated success rates are based on chi-square/transformed mean estimates from the statistical analysis.

ANIMAL SAFETY

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

Horses in all EQUISUL-SDT groups demonstrated statistically significantly higher mean serum creatinine concentrations, and those in the 3X and 5X groups demonstrated statistically significantly higher mean serum albumin concentrations. Statistically higher mean neutrophil counts and mean serum gamma glutamyl transferase (GGT) activity were seen in the 1X and 5X groups. Individual animal creatinine, GGT, and albumin concentrations remained within the reference range. Individual animal elevations in absolute neutrophil counts ranged up to 7.09 x 10⁹/mcl (reference range: 1.96–5.31 x 10⁹/mcl).

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

STORAGE CONDITIONS

Store upright at 59°–66° F (15°–30° C). Brief periods up to 104° F (40° C) are permitted. Protect from freezing. EQUISUL-SDT in containers of 280 mL and 560 mL — discard 60 days after removing bottle seal.

HOW SUPPLIED

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

[footnote]

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



01/2021

Biosecurity Protection Against Infectious Disease

Infectious disease is another key risk factor for respiratory problems. Similar to the contact tracing done with human coronavirus, the Equine Disease Communication Center (EDDC) keeps close monitoring on infectious disease outbreaks throughout the United States. Equinediseasecc.org is a great resource to identify diseases near your location and in advance of your clients' travel with their horses.

Basic biosecurity practices are important to control disease across a property, especially to protect against respiratory disease. Separate new from resident horses at a sufficient distance for two to three weeks following arrival and handle new arrivals after first caring for the resident population. Monitor daily for changes in rectal temperature, respiratory character, cough, nasal discharge and fecal character or consistency.

The biggest risk for disease transfer occurs from direct contact—horses touching noses, sharing food and water, or sniffing urine and manure. Provide separate water and feed sources for each horse when possible. Indirect horse contact of a surface contacted by another horse—fences, gates and stall walls—might transfer infectious material from horse secretions. Disinfect equipment that could be contaminated with disease-causing agents such as horse trailers, tractors and other wheeled equipment that circulate around the farm. Park equipment in spaces that are not contiguous to stabling and riding areas. Dispose of contaminated cleaning solutions and bedding in a manner that prevents further contamination of the premises. Clearly mark isolation boundaries with signs. Prevent contact between horses in isolation and others on the farm not only by physical separation but also with anything or anyone that might move between horses, such as

feeding and cleaning equipment, tack and grooming equipment, handlers and workers. Veterinarians, farriers and adjunctive therapists can serve as fomites, as can dogs and cats.

There is a true story of a dog soaking itself in a strangles-contaminated water tank—he carried disease around the premises on his wet body, especially after jumping into another water tank.

Vaccine and Preventive Care Protection Against Infectious Disease

Equine respiratory health care and immunity rely on maintaining an effective vaccine and deworming program, quality nutrition, conditioning programs and biosecurity measures to reduce risk of exposure to infection.

A new horse entering a farm or horses coming to an event should have a current negative Coggins (ELISA or AGID) test for equine infectious anemia (EIA) as well as a Certificate of Veterinary Inspection (CVI) within the immediate time period prior to moving the horse. All incoming horses should be current on immunizations against contagious diseases.

Once a primary series of influenza and respiratory herpesvirus vaccines have been administered, boosters are given twice yearly to offset waning vaccine efficacy after four to six months. The United States Equestrian Federation (USEF) requires flu and rhino boosters within six months of entering a venue, while the Fédération Équestre Internationale (FEI) requires twice-yearly flu boosters at six-month intervals. These immunizations must be documented by a veterinarian. Immunizing all horses within a herd—resident and traveling individuals—confers an added layer of protection through herd immunity.

Older horses are at risk of immunosenescence, which decreases the immune system's ability to respond to antigens and vaccination products. Approximately one-third of the older

horse population is affected by pituitary pars intermedia dysfunction (PPID, or Cushing's disease), adding concerns regarding immunosuppression to other age-related influences. For these individuals, it might be better to give single injections of each vaccine antigen rather than combining multiple antigens into one injection.

Measures to Prevent and Mitigate Airway Inflammation

Practical strategies minimize the particulate load inhaled by horses to benefit airway health:

- Soak or steam hay to decrease particulates in a horse's breathing zone while



eating. Feed outside and from the ground when possible.

- Clean stalls once or twice daily to remove urine-soaked bedding and feces. Strip stalls weekly.
- Minimize raking and sweeping while horses are inside and turn horses outside for a couple of hours during barn cleaning to decrease dust exposure. Dampen barn aisles, especially during sweeping. Refrain from using leaf blowers within the stable.
- Provide good drainage in stalls and aisle ways to facilitate exit of urine. Clean under mats regularly.
- Use the least dusty and the most highly-absorbent bedding possible, such as wood shavings, peat moss, or shredded paper products. Mix an ammonia-neutralizing product with clean bedding.
- Avoid storing hay overhead or in adjacent stalls as movement of hay

aerosolizes dust and particulates.

- Water riding arenas to decrease dust.
- Keep the barn well ventilated. Open windows and doors as much as possible. Passive movement of air flow is optimized in a barn design that allows ridge ventilation with louvered cupolas or vents. Exhaust of air through ridge vents works best when coupled with soffit screens where walls intersect the roof—air moves in at the soffit level and out at the ridge vents.
- During transport, dampen hay to decrease dust particulates, and frequently clean soiled bedding from the trailer. Open all vents and windows, and when possible remove the horse from the trailer every three to four hours to allow head-down clearance of the airways and access to fresh air.

Medication therapy to mitigate airway inflammation has evolved tremendously in recent decades. Clenbuterol is an oral medication that has been available for a long while as an effective bronchodilator. Currently, an inhaled corticosteroid delivered by Aservo EquiHalerm (ciclesonide inhalation spray from Boehringer Ingelheim) produces excellent, safe results in decreasing respiratory inflammation with as few systemic effects as possible. Other respiratory medications are in the process of being researched for their efficacy and safety for use in horses.

The Bottom Line

The best strategy for equine respiratory health is to house horses outside whenever possible to promote a clean air environment. Feed excellent-quality forage that is as dust-free as possible. Keep respiratory immunizations up to date and implement careful biosecurity practices. Follow suggested guidelines for prevention of airway inflammation and disease to optimize equine respiratory health and performance.

Many of these management practices on horse farms are helpful in protecting human respiratory health, as well. **EM**



**Ambulatory vets
struggle to achieve even
50% billable hours.**

Time Management Tips for Equine Veterinarians

Improving your productivity using some of the tips in this article can enable you to be more efficient, more profitable and less stressed.

By Amy L. Grice, VMD, MBA

The concept of billable time is one that is well established in the professions of accounting, law and architecture

but is rarely considered in veterinary medicine. Veterinary medicine can be highly inefficient in some sectors. Ambulatory equine veterinarians often struggle to achieve even 50% billable hours of the time they spend working. Since there is no way to add more hours to the day, the number of billable moments is finite, and as a medical professional, you only have your time to sell.

One of the ways to determine your efficiency is to track your time in 15-minute intervals throughout a typical workday or two during each quarter or month of the year. You simply create two columns—Billable and Not Billable—and put a check mark in the appropriate box for each 15-minute period of the time you spend at work that day.

Billable activities are those for which you will write an invoice—services such as exams, performing diagnostic tests or giving treatment. Non-billable time does not increase your revenue, and it includes things like client communication, driving, cleaning up after services, restocking your truck or attending practice meetings.

Because most ambulatory veterinarians charge a “trip fee,” some feel that windshield time is a billable item. But since trip fees are generally used to offset the cost of maintaining fleet vehicles, it is debatable.

Using a third column designated Travel can help ambulatory practices determine what percentage of their time is spent behind the wheel.

The importance of understanding your efficiency cannot be overstated. You can increase your practice revenue and decrease the number of hours spent working if you can find new ways to maximize your billable time. You can adjust your fee structure for



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Employing an assistant can help improve a veterinarian's efficiency.

billable services to account for the necessary time spent on activities for which you cannot charge.

Regularly scheduling calls in certain geographic zones on certain days of the week can limit the time spent driving between farms, and clients will quickly become accustomed to when you are normally in their specific area. Using a driver can free you to make callbacks, write medical records and prepare laboratory submissions while travelling. This can bunch multiple non-billable tasks that are then done simultaneously, saving you time later. Employing a veterinary assistant can help with efficiency in a similar way.

The nature of veterinary medicine makes efficiency challenging, because every day is different, emergencies often interrupt the flow of the day, and doctors have a lot of different roles that they might be juggling (veterinarian, practice owner, parent, caregiver, spouse, etc.). Medical knowledge is always changing, compliance with OSHA and DEA regulations has to be considered and technology innovations develop at lightning speed. Simply keeping up is hard!

In addition, attracting and retaining

more graduates in equine veterinary medicine will likely require higher compensation. The only ways to generate the increased revenue needed to support salaries more comparable with companion animal practitioners are to increase the number of patients seen, increase the number of services provided per patient, and/or charge more for professional time. Practices that are highly efficient can more readily achieve these three.

Use of Technology

One way to increase efficiency is to use technology to help with communication, collection and marketing. There are a number of outside companies and apps that simplify these functions.

For example, creating a payment portal on your website can make payment of invoices convenient and simple for those horse owners who are not present at the time of your visit. Use of a phone solution such as Grasshopper can simplify routing calls, allow better boundaries and minimize cost. Even setting automatic text replies on a smartphone can set expectations for clients as to when they can expect you to reply.

Employees and Delegation

When a veterinarian has staff members, efficiency is maximized when he or she is comfortable with delegation. Many doctors have difficulty with letting go and trusting someone else to complete tasks, but that is necessary in order to build a better work-life balance.

When hiring employees, it is important to look for shared values and a positive attitude. When everyone is on the same team, trying for the “win,” efficient operation is much more possible. A team member who fits the practice culture will outperform a person with outstanding skills who does not. Having friction between people is a significant obstacle to efficiency.

To ensure the best performance from employees, training needs to be ongoing to increase competencies and allow the doctors to “offload” responsibilities that do not require a veterinary degree. Utilization of staff to the fullest extent of their abilities raises revenue, job satisfaction and productivity. Everyone benefits.

Reduce Clutter and Chaos

A simple way to reduce the time your work takes is to increase your organization and reduce clutter and chaos.

Having a place for everything and putting everything in its place after use is paramount to working efficiently. Handling paper and searching for paper documents consumes a lot of employee time, according to research. IDC's Information Worker Survey revealed that workers spend five hours per week searching for documents.

Consider having a well-organized electronic file of documents to share with clients by e-mail. These documents could include post-care instructions for certain conditions, an informational “what to expect” FAQ or an event invitation. Laboratory submission forms can similarly be filed on your computer so they can be filled out while driving. The key is to organize materials in files and name them consistently.

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Choice of Time Spent

One of the pleasures of practice is the interesting people that fill our days. Over a career, veterinarians often develop close relationships with clients and co-workers, watch their families grow up, and share many experiences.

It is easy and pleasurable to spend time chatting and socializing. Unfortunately, that time eats into efficiency and can readily fill even a not very busy day. Many veterinarians allow a “slow” day to fill as many hours as a very busy day, as they enjoy slowing their pace. This might be exactly what the doctor needs, but it is important to be mindful that it is a choice of how to spend this time.

A challenge that most equine veterinarians face is the lack of control over their time due to emergency duty obligations. Unfortunately, many practices also expect their doctors to be available to clients nearly all of the time, even when they are not on call, as a demonstration of their dedication.

In order to manage their time so that they have opportunities for lives outside of practice, development of personal boundaries is critical. Setting boundaries is essential, because without them you will likely start to feel undervalued, underappreciated, disrespected or worse. Without this space carved out, your work can become all-consuming until you have nothing left to give.

Equine doctors who join emergency service cooperatives can often achieve more time away from work obligations. This is of particular benefit to solo practitioners. The collaboration and networking that are needed to do this successfully take time, but very little compared to the endless weekends on call that would otherwise result.

Utilizing a four-day work week can help equine veterinarians carve out time for other professional needs such

as reading journals, practicing new techniques or pursuing specialized education. Alternatively, the “extra” day could be used for personal activities that decrease stress, increase well-being and improve happiness. It is no surprise that the productivity of doctors who are rested, less stressed and experiencing joy in their lives is higher than those without these things. Even simply incorporating a “hard stop” to the day for doctors not on call can be achieved by not scheduling any appointments past mid-afternoon.

Having the self-discipline to allow oneself this freedom can be challenging for some. The traditional work ethic of

detail, motor skills and emotional state.

Drinking liquids throughout the day is an easily missed component of time management and efficiency. Optimal hydration increases energy, improves brain function, reduces stress, improves mood and prevents many headaches. It is easy to just keep working and forget this simple piece of self-care, but what a positive difference it can make!

Take-Home Message

Time management and efficiency are important concepts for veterinarians. However, if you’re feeling overwhelmed and stressed, time management strategies might not help. In fact, constantly

trying to improve your efficiency can make things worse if, as you become more efficient, you make room for even more tasks and feel even more pressure.

When you’re feeling overwhelmed, you are better served by attacking the root cause: the sheer volume of tasks. This means learning to delegate tasks that others can do and being honest with yourself—and others—about what you can actually commit to. Remember that saying “no” is sometimes the lifeline you need.

In summary, seeking data to illustrate your current level of productivity is the first step toward improvement of your efficiency. Envisioning your desired work outcomes can lead to hiring compatible staff members or improving the training and utilization of those already on your team.

Increasing trust and delegation can free up time. Utilizing technologic solutions, embracing a tidy and organized workflow, and being open to new paradigms are all ways to enhance your time away from work and maximize your efficiency. Then be sure to use the time you free up in ways that enhance your well-being. **EM**



GETTY IMAGES

equine veterinarians is to be available all the time. By challenging this paradigm, doctors might feel they do not belong “in the family” of equine veterinary medicine, are “not enough” or are “unworthy.”

Time management really becomes self-management. It is necessary to take responsibility for creating the life you want to lead. While this can be difficult, it is ultimately rewarding.

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Winter 2021

Resources

A full-page photograph of a smiling female veterinarian with dark hair tied back, wearing light blue scrubs and a stethoscope. She is holding a white horse with a purple halter. The background is a bright, outdoor setting with a clear blue sky and some greenery.

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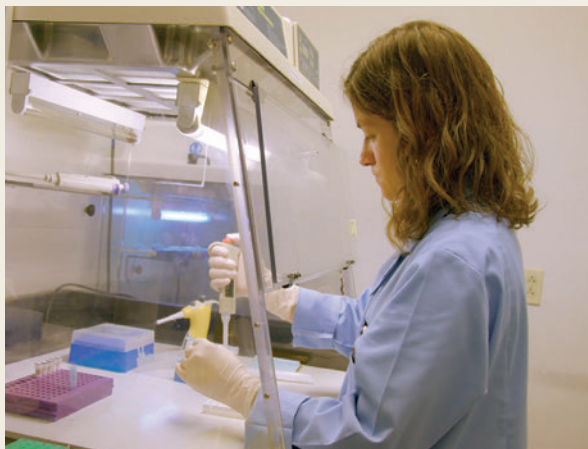
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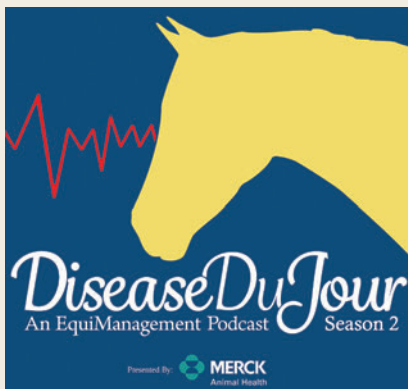
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EquiManagement's Disease Du Jour podcast series was created for equine veterinarians, vet students, vet techs and industry professionals. The podcast mostly focuses on equine health subjects, but it also covers topics of importance to the equine veterinary industry and individual veterinarians. The 2021 and upcoming 2022 seasons of the Disease Du Jour podcast are brought to you by Merck Animal Health. *You can listen to the Disease Du Jour podcast on EquiManagement.com or your favorite podcast network. Some podcasts have bonus webinars available on EquiManagement.com. (See American Horse Publications award information pertaining to Disease Du Jour on page 100.)*



The Business of Practice Podcast

EquiManagement's The Business of Practice podcast was created for equine veterinarians, vet students, vet techs and industry professionals. This podcast focuses on the financial and human sides of equine veterinary medicine. Topics have included burnout, developing an emergency veterinary services co-op, marketing your veterinary practice, dealing with dissatisfied clients, employment agreements, compassion fatigue, improving cash on hand, work-life balance tips, ethical challenges in veterinary practice, and many more! *You can listen to The Business of Practice podcast on EquiManagement.com or your favorite podcast network. The Business of Practice podcast is brought to you in 2021 by Dechra Veterinary Products.*



Managing Accounts Receivable

Are you giving interest-free loans to your clients?

By Amy L. Grice, VMD, MBA

Undoubtedly the best way to handle accounts receivable (AR) is not to have any! Accounts receivable are monies owed to you from invoices that clients have received for your services but have not yet paid. These funds are considered current assets on your practice's balance sheet.

Current assets are those that can be converted to cash within 12 months. Although a few AR at some practices are many years old, most are more current. A practice's accountant generally will write off markedly aged AR as uncollectible.

Many practices, especially those established in the last decade, follow the business model of payment at the time



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The hard fact is that you cannot afford to be your client's banker.

that services are rendered. Typically, the veterinarian prepares a medical record and invoice on practice management software installed on a laptop that travels with him or her in the truck. Then the veterinarian e-mails these documents to the client at the end of the visit.

If the client is attending the appointment, payment by cash or check can be collected while the doctor is present, or an authorization to charge a credit card on file is given. In the case of absent owners, typically the invoice is emailed. The client has the opportunity to send an electronic payment, mail a check or have the amount charged to a credit card on file with the veterinary practice.

The Old Way

The traditional equine practice busi-



ACCOUNTS RECEIVABLE

ness model of monthly invoicing often creates substantial accounts receivable. In that model, clients receive monthly bills for all services rendered during the previous month. Perhaps because there is a time lag between the visit or visits and receipt of the invoice—and the total can be substantial—it is not uncommon for clients to take 60 or even 90 days to pay. With monthly billing, cash flow is always reduced.

Creating invoices in this older model rarely occurs at the time of service. Typically, doctors or assistants fill out a check sheet or write a paper visit summary that is later transcribed by office staff into a computer system. The resulting invoices are typically printed at the end of the month, stuffed into envelopes and mailed through the USPS. Some ambulatory practitioners keep track of visits with a bound diary book; then they write all their medical records and invoices at the end of the month.

Research suggests that this time lag might result in failure to bill for up to 30% of services rendered and products dispensed. Even writing invoices at the end of each day can create a significant loss of earned revenue. Because there are costs associated with providing services, the failure to capture “whole”

revenue can be devastating to the bottom line. Because practice value is based on profit, allowing profit to leak away through failure to capture all the charges for the work done can erode practice value substantially.

Accounts receivable are aged by how long they are outstanding, typically 0-30 days, 30-60 days, 60-90 days and over 90 days. Some practice management software allows you to expand this to include time intervals of up to six months. Amounts still due after six months are generally considered uncollectible. If valuing a practice, AR is discounted according to the length of time outstanding. Those accounts over 90 days are typically considered to have little to no value.

Veterinarians Are Business Owners

Veterinary practices are small businesses. The U.S. Bureau of Labor Statistics reported that in the 20 years between 1995 and 2015, about 20% of small businesses failed within their first year. Another 10% failed in their second year. By the end of five years, more than 50% of new small businesses had failed. After 10 years, 70% were no longer viable.

The biggest cause of business failure

is poor cash flow. Having outstanding client payments due for work a firm has already completed hampers the ability to pay loan payments, suppliers, rent and employees, especially during the slow seasons.

Because running out of money is the biggest risk of small business, owners need to know what funds are needed day to day, but they are often unclear how much revenue is expected each month or what expenses will be due. The lack of a budget and cash flow projections can make practice ownership quite stressful.

A survey done in 2017 by Fundbox (fundbox.com/blog/slow-payments) showed the effect of late or unpaid invoices. The results suggested that when AR is high, 79% of small business owners can't pay themselves, 23% can't hire new employees, 23% can't invest in new equipment, 20% cease marketing efforts and 17% have trouble purchasing inventory. The study concluded that small businesses need to collect outstanding payments promptly if they want to maintain cash flow and improve their chances of success.

The accounts receivable turnover ratio is an accounting measure used to quantify a company's effectiveness in



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collecting the money owed by customers or clients. This ratio measures how well a company manages the credit it extends to customers and how quickly that short-term debt is collected. A business that collects quickly on its payments due will have a high accounts receivable turnover ratio. A high ratio suggests that a company is conservative when it comes to extending credit to its customers. A low AR turnover ratio could be the result of insufficient collection efforts, inadequate credit policies or continuing to serve clients who are not financially stable or good credit risks. Typically, a low turnover ratio implies that the company should reassess its credit policies.

By monitoring the AR turnover ratio trend within a practice, the owner can easily see when improvement is being made.

Accounts Receivable Turnover = Total Credit Sales/Average Accounts Receivable

To calculate the AR turnover ratio, add the value of accounts receivable at the beginning of the month, quarter or year to the value at the end of the chosen period; then divide the sum by two. The result is the average accounts receivable. Then divide the value of credit sales (the revenue generated from work not paid at the time of service) for the chosen time period by the average accounts receivable during the same period. To determine the average number of days to collection, divide 365 by the AR turnover ratio.

As an example of an annual Accounts Receivable Turnover:

Practice A:

Credit sales in 2020 = \$800,000

AR total on January 1, 2020 =

\$235,000

AR total on December 31, 2020 =

\$274,000

Average AR = $\$235,000 + \$274,000 / 2$

= \$254,500

Accounts Receivable Turnover =

$\$800,000 / \$254,500 = 3.143$

Average days to collection = 365 days

$/ 3.143 = 116 \text{ days}$

Practice B:

Credit sales in 2020 = \$200,000

AR total on January 1, 2020 = \$15,000

AR total on December 31, 2020 =

\$12,300

despite the fees involved. Merchant charges are a cost of doing business, and veterinary fees should reflect this cost.

Reducing Accounts Receivable

If a practice has significant AR, there are ways to begin to reduce the number of outstanding accounts. Maintain an accurate AR aging report and review it monthly or even more frequently. You can assume that clients who normally pay promptly—but suddenly have an overdue account—have simply forgotten to pay or did not receive the invoice. The first step is a friendly reminder. When following up on missed payments, make sure the message is polite and courteous, and that it invites the client to contact

the practice in case there is an issue that needs to be discussed.

Creating a standard, friendly nonpayment email template that can be sent when these situations arise will help staff. The message clearly defines the next steps if the client doesn't reply or pay within 30 days, and it should

be followed by a call if the client does not respond.

Clearly delinquent clients need to be called promptly, starting with those with the highest amounts due; but do not ignore those with smaller amounts. Because collection calls are difficult to make, if you task them to a staff member, be sure to give that person training and support. Some practices give bonuses to employees who successfully collect old debt. If you choose to offer a percentage of collected monies, be sure that the tactics and communication meet your standards.

If calls are unsuccessful, send a letter clearly stating the consequences of further delays in payment. These letters



Average AR = $\$15,000 + \$12,300 / 2 =$

\$13,650

Accounts Receivable Turnover =

$\$200,000 / \$13,650 = 14.652$

Average days to collection = $365 \text{ days} /$

$14.652 = 25 \text{ days}$

Remember that when a practice carries AR, it is essentially extending loans to its clients.

Practices frequently add interest charges on overdue amounts, but clients often will not pay those additional fees, and practice owners often do not insist. Acting as a bank offering interest-free loans is not financially savvy. Utilization of credit cards or services such as CareCredit is a much healthier solution,

should reflect your written financial policy. For instance, clients with accounts delinquent 90 days or more will only receive additional service with cash at the time of service, or they cannot receive any further services until the amount due is paid in full. If you are actively treating a case, you must be sure to follow your state's laws with regard to cessation of service.

As a last resort, you might decide to utilize a collection agency or an attorney. Both of these options can be expensive, with collection agencies keeping an average of a third of monies collected. Small claims court can often yield a successful judgment, but that can take significant time and will not always result in the receipt of money.

Preventing Accounts Receivable

An ounce of prevention is worth a pound of cure. Preventing the accumulation of AR is a goal for all practices. Simple methods to do this include transitioning to payment at the time of service, creation of a financial policy and making payment as simple and convenient as possible.

Payment at the time of service typically requires that clients maintain a credit card on file with the practice, be present at each appointment, or make other arrangements for payment. A few established clients who have been billed for many years are commonly affronted by this change, but they can often be placated by explaining the "why."

The efficiencies of doctor-driven billing without the involvement of multiple other staff members will help minimize fee increases. These efficiencies help practices afford to increase salaries for veterinarians that are presently very hard to attract and retain in equine practice. For clients that routinely have multiple visits each week, such as at breeding farms, offering a once-a-month charge on a client's credit card at the end of each month—with a monthly invoice they have several days

to review—might be the best option.

Creation of a financial policy is a crucial step in reducing high accounts receivable totals. All clients and doctors must be expected to follow the policy in order for it to be effective. There cannot be "special" clients or practice owners who flaunt the rules without consequence. The policy should be written and circulated to existing as well as new clients. It should clearly indicate payment terms, define how much time a client has to pay an invoice and what happens if payment is not received by the due date.

Creating a FAQ document can be very helpful when rolling out a new policy. All clients should sign a form acknowledging they understand the payment policy and perhaps giving permission to charge their credit card for each invoice. This form is often paired with "permission to treat" language.

By streamlining payment methods, you can make collection more efficient and convenient for your clients. Credit cards, PayPal, Zelle, Venmo, Google Pay and other applications are available that many clients utilize regularly. Allowing payment through the practice website can increase compliance with policies. Some clients will continue to prefer checks and cash, and by being present at appointments or making prompt payment after receipt of the charges, they can be easily accommodated.

Take-Home Message

Change is always hard, but making the effort to reduce accounts receivable is worth the discomfort. Business health requires reliable cash flow, and payment at the time of service can minimize accounts receivable and maximize efficiency. Consistent financial policies and deliberate methods for collecting overdue accounts can change the landscape. Equine practices can successfully adopt new paradigms with leadership from practice owners. **EM**



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EquiManagement Shines in AHP Awards

Providing useful information in a variety of formats for the veterinary industry is the goal of EquiManagement, and it's icing on the cake when your publishing peers honor you!

By Kimberly S. Brown

EquiManagement continued its winning ways at the 2021 American Horse Publications Equine Media Awards. A highlight of the AHP's "Back in the Saddle" Conference, the awards dinner was held on the evening of September 18 in Irving, Texas.

EquiManagement clinched top honors in the "Breaking News or Investigative Reporting Single Article" category with Dr. Amy Grice's "Effects of the COVID-19 Pandemic on Equine Practice." Production of this article was supported by Merck Animal Health.

This article was based on a survey created and conducted by EquiManagement and Grice, VMD, MBA, to gain insights on equine practice, changes, issues and outlooks from the 2020 COVID-19 pandemic. The survey was administered in August of 2020 and was published in the winter 2020 issue of EquiManagement magazine. When the article was posted online in December 2020, the numbers in the initial paragraph were updated to reflect the state of the world at that time.

EquiManagement also received Honorable Mentions in the categories "Service to the Consumer Single Article" and "Publishing Media Equine-Related Podcast."

The Honorable Mention in "Service to the Consumer Single Article" came for

"How to Embrace and Leverage Growth Mindset" by Dr. Colleen Best.

In this article, Best stated, "Growth mindset is incredibly powerful and can help you release yourself from the fear that comes along with failure." She also noted, "Those with a fixed mindset hold a belief that basic qualities, such as intelligence or musical ability, are fixed and cannot be changed. People with a fixed mindset frequently believe that talent—

not effort—leads to success."

She summed up the article by saying, "Growth mindset is incredibly powerful. When we truly believe that we can do anything we set our minds to, we release ourselves from the fear that comes along with failure. We are able to try and try again until we meet our goals. We open doors that we might have closed long ago, or never opened. What would you try if you knew you couldn't fail?"

You can find that article on EquiManagement.com.

EquiManagement's Disease Du Jour podcast—which is published every other Thursday on your favorite podcast network and can be found on EquiManagement.com—received an Honorable Mention in the Publishing Media Equine-Related Podcast category. This podcast series was created for equine veterinarians, vet students, vet techs and industry professionals. It was launched in 2019 and has received rave

reviews for content focused on education for the equine veterinary industry. The Disease Du Jour podcast is presented by Merck Animal Health.

The specific episode that was entered in the contest was Episode 23: Dr. Nicola Pusterla on Equine Coronavirus. Topics of discussion in the podcast were:

- Does equine coronavirus affect humans?

- What is equine coronavirus?
- Clinical signs
- Spread
- Diagnosis
- Treatment
- Prevention

While we appreciate these honors, our goal still is to provide useful information to the equine veterinary industry on a variety of platforms. If you have suggestions, contact me at kbrown@equinenetwork.com. **EM**



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While some vets love in-person CE, others are happy with more online options.

The Continuing Education Pivot

There are many options for veterinary continuing education, whether you choose live or virtual events.

By Katie Navarra

Due to the pandemic, it seemed like overnight, schooling moved online. Students, parents and teachers scrambled to adopt new technologies to gain critical information for learning. Veterinarians with kids had double the learning curve—helping their children keep up in school while keeping pace with their own CE. Even in a year like 2020—with unprecedented challenges—many continuing education providers were able to make program changes that allowed the

educational event to go on.

“CE is such an important part of veterinary practice,” said Deborah Spike Pierce, DVM, MBA, president, CEO and a shareholder of Rood & Riddle Equine Hospital. “It is where we learn new things and also provides data on procedures and conditions that we can take back to our clients. It can also be where we meet up with colleagues and old acquaintances and make new friends.”

Perhaps more exciting than discovering how agile organizations were in their switch to online learning is the growing

need for continuing education. Colorado State University Equine Reproduction professor Patrick M. McCue, DVM, PhD, DACT, of the Clinical Sciences Department, sees an increasing need for ongoing educational opportunities.

“I think it’s a reality that vet students don’t have as many hands-on opportunities for learning anymore, as they may have in years past,” he said. “The cost of maintaining a teaching herd is one reason. In some vet school hospitals, the caseload is lower than it was in the past so students may not see or interact with



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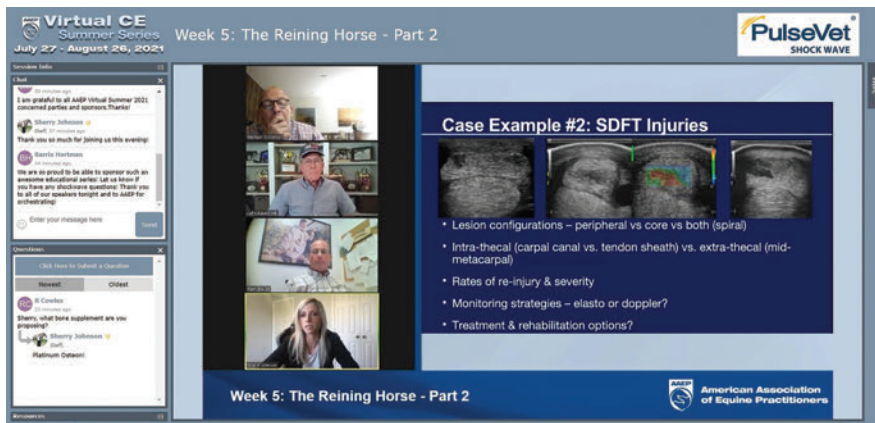
as many different cases as previous students. That makes CE the way some are gaining this experience.”

Even if you haven't attended a continuing education event yet this year either live or online, there is still time.

On the fence about what format works best for you? Here are a few things to consider when choosing between online, in-person and hybrid events.

The Best of Both Worlds

With social gathering restrictions locking back down again, what will the future of continuing education in the “new world” look like for veterinarians? McCue believes the hybrid model—which blends online and in-person learning—will be increasingly common. The pandemic has forced event planners to pivot unexpectedly, but those changes brought a bright spot—an acceptance of a blended hybrid online/in-person approach to continuing education.



AAEP's Virtual CE Summer Series was a hit with veterinarians.

“It maximizes the learning experience by explaining the theory and diagnostics of the subject ahead of time, which there is not always time to do in a wet lab,” McCue said. “It means vets can spend a little less time away from their practices to attend a physical wet lab that had an online lecture first, which would have historically been covered over two or three days at an in-person program.”

The Northeast Association of Equine Practitioners (NEAP) is one of several conferences that had planned to continue with this model for its 2021 Saratoga Vet & Farrier conference. Lecture-style educational sessions were planned for online, but pandemic restrictions caused

the cancellation of the in-person wet lab and trade show gathering in Saratoga Springs, New York, in September.

“Lectures being available online has given attendees the freedom to watch the lectures on their own time, in the comfort of their own home,”

said Tonya Ogden, executive assistant for AAEP. “It also gives extra time to complete.”

The 67th Annual American Association of Equine Practitioners (AAEP) Convention and trade show is moving forward with a live event as well as online options for those who choose not to attend in person. As of August 31, the AAEP noted, “All individuals attending the 2021 Convention will be asked to provide proof of COVID-19 vaccination or a negative COVID-19 test 72 hours before the event.”

In-person attendees will meet in Nashville, Tennessee, from December 4–8, 2021, and attendees from around

the world can purchase access to some live and recorded CE opportunities. As a bonus, anyone who attends the on-site conference receives the access to on-demand recordings as part of their registration fee so they can catch sessions they might have missed because of overlapping schedules.

There will also be about a dozen live table topics specifically for the virtual attendees, noted AAEP Director of Education Karen Pautz. Of course, she added, there will be live table topics available as usual at the in-person convention.

The All-Virtual Option

For many years, technology has made it possible to access continuing education when it is impractical to take time away from the practice. Virtual conferences also tend to be easier on the budget. There are no hotel fees, travel costs or meals out, and there is no lost income from being away from practice. With the forced shift to online during the pandemic, veterinarians now have greater opportunities for learning about the latest research without the stress and hassle of travel.

"Many meetings were more affordable without travel and hotel," Pierce said. "For me, the most desirable feature was not having to find childcare for when I would have been away."

This model also leveled the playing field for new and senior associates. When a practice creates a CE budget it's unlikely everyone is able to travel to the most-desired CE offerings. The lower cost of virtual CE increases opportunities for newer graduates to participate, since pre-pandemic, they were the vets most likely to stay at the practice and be on call while senior veterinarians attended the conference.

Virtual workshops aren't without challenges. It is easier to get distracted in the middle of a session or skip out altogether when an unplanned event arises.

"Let's face it, if we have other things

that need to be done, they tend to take priority because you are not 'away,'" Pierce said. "I believe the more that these are offered, the more comfortable we will be at blocking out time."

Most online providers offer on-demand access to recorded sessions. Make sure to confirm how long the archives will be available. Some providers make them accessible indefinitely; others allow access for only a limited time. Another bonus: Online usually provides access to all of the educational sessions. Conferences typically have two, three or four sessions running simultaneously. It's impossible to be in all of the presentations at once at a live conference. Recorded sessions increase the number of learning opportunities.

"Make the most of the extra time allotted to watch all of the lectures online," Ogden said.

Of course, there is a drawback to on-



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Ask yourself whether virtual or live CE provides the most benefit for you at this stage of your career.

line events—interaction with colleagues, mentors and new acquaintances is limited. McCue said that when he attends events live, the most memorable moments from continuing education come from hallway conversations. Impromptu interactions during lunch breaks and in passing just can't be replicated virtually in the same way as an in-person event.

"Chatting with others to learn how they do something is one of the greatest things about in-person events," he said. "It's a great place to build a network of other practitioners that you can reach out to."

Making Choices

When choosing between CE providers, it is important to look at the program closely to see if it provides what you are looking for. There is basic continuing education and there are in-depth and hands-on programs.

Before signing up, McCue suggested considering the place or organization offering the CE. It is important to understand the expertise of the lecturers and, when applicable, whether the provider has adequate physical facilities and horses to hold wet labs. That will ensure

you're getting the most out of your investment. Also, ask yourself which type of CE provides the most benefit for you at this stage of your career.

"Maybe you have a friend attending a CE offering, and attending can be about more than just CE. There is nothing wrong with that," Pierce said. "Maybe it is in an interesting place and would be a good family vacation. With so many CE options available, you can easily cater to your needs, both professionally and personally."

Over time McCue has seen that vet students have fewer opportunities to study specialties such as reproduction, lameness and dentistry. Yet he finds vets are hungry for this type of knowledge. Relying on CE to provide this type of training is going to become more and more common, he predicted. CE helps new graduates, or those faced with a new career path, fill the training gaps on some of the techniques they haven't been able to do often.

"As an instructor, one of the highlights for me has always been watching novices learn, develop and find the confidence they lacked in the past," McCue said. "Every year we also get a number

of very experienced practitioners. At least one of them always says 'I want to take home one new thing.' That is a win for them. It is a joy to realize that some of the people I am instructing have a lot of experience and are still eager to get more knowledge."

Maximize Learning

Preparation is the key to making the most of any conference regardless of whether it is in-person, online or a mix of both. Download the event app or visit the online agenda in advance of the meeting to get familiar with what is being offered. Strategically mapping out a schedule helps reduce stress around making decisions on which sessions to attend.

Knowing what you hope to gain from the experience can guide you in determining which functions to attend. That can range from learning new skills to finding your next job. Is your goal to improve your knowledge of a treatment protocol? At in-person events, you might be hoping to meet a clinic owner looking to hire.

Attend the in-person event to gain hands-on experience that is not replicable via online resources. Don't be afraid to ask questions and share your thoughts/experiences with other professionals at these events.

Take-Home Message

There are pros and cons to live and virtual veterinary continuing education events. At live events, you can have the personal, impromptu meetings that are so valuable to many veterinarians. At virtual events, you have the flexibility to attend CE on your own schedule and can stop and come back to complete a single presentation.

There is no right or wrong answer, but there are decisions to make based on your circumstances and needs. The good news is that there are many quality virtual CE options available to equine veterinarians if you choose not to travel in these challenging times. **EM**



Treatments for tendon and ligament injuries seek resolutions as well as a lower risk of reinjury.

Tendon and Ligament Injury Treatments

Researchers cover a wide variety of treatments and modalities for tendon and ligament injuries.

By Nancy S. Loving, DVM

The Northern California Association of Equine Practitioners hosted David Levine, DVM, DACVS, DACSMR, of the University of Pennsylvania, in early 2021 to present a thorough discussion on treatments for tendon and ligament injuries. He explored commonly used procedures and offered information about a new device that holds promise for resolution of lesions and reduction in risk of reinjury.

Levine advised that it is not always

beneficial to apply every possible therapy, and that it is important to determine the type of work a horse is doing and whether a lesion is acute or chronic.

Platelet-Rich Plasma

Platelet-rich plasma (PRP) is known for providing invaluable growth factors with anabolic effects. When injected into tendon or ligamentous tissue, collagen, glycosaminoglycans and cellularity increase along with elasticity and improved strength. The tissue is better organized

and heals with less scar tissue; improved tensile strength reduces reinjury risk.

Ideally, the gold standard for activation of PRP is done through freeze-thaw cycles that elicit degranulation of the platelets to release growth factors.

Extracorporeal Shockwave Therapy (ECSWT)

Another means to achieve platelet activation is through shockwave therapy, which can increase platelet growth factors by 200%.

Shock wave therapy is an extralesional modality that decreases pain and might decrease reinjury rate in addition to its newly recognized role in activating PRP.

Stem Cells

Levine described stem cells as those that are self-renewing, unspecialized and retain potency. Multipotent stem cells are mesenchymal cells of one particular line that produce bone, fat, tendon and ligament. Adipose-derived stem cells from fat in the tailhead have an advantage in that they are available for use within 24 hours, but they are available only in limited numbers. Stem cells can also be obtained from bone marrow of the tuber coxae or sternum. Bone marrow-derived stem cells are cultured over three to four weeks to produce large volumes, which can also be frozen for future use.

Levine cautioned against repeated stem cell injections due to an increased risk of calcification.

Stem cells appear to have immune-modulating effects by rearranging tissue to improve repair and decrease reinjury rate. In one study, 9/12 horses treated with stem cells competed without relapse in comparison to 15/15 non-treated controls that experienced reinjury within seven months [Pacini, et al, *Tissue Engineering*, 2007; doi: 10.1089/ten.2007.0108].

Another study reviewed results of 168 racehorses treated with stem cells and rehabilitated over 48 weeks, which resulted in a low 18% reinjury rate [Smith, R.K.W., et al, *Disabil Rehabil* 2008; doi: 10.1080/09638280701788241].

Autologous Protein Solution (APS)

Autologous protein solution (APS) combines PRP and IRAP constituents for treatment of tendon and ligament injury. A presentation at the 2020 ACVS

conference by Angela Gaesser, DVM, DACVS-LA, reviewed an SDF model using a single intralesional autologous protein solution. Of the most significance was a greater increase in collagen-3 gene expression in saline-treated tendon compared to APS-treated tendon. It is more desirable to have collagen-1 repair, because collagen-3 results in inferior biochemical healing.

Superior Check Ligament Desmotomy

Surgery to cut the superior check ligament releases its tether to bone to elongate the superficial digital flexor tendon (SDFT). This transfers force to muscle, which is more elastic compared to tendon.



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Levine stressed the importance of isolating and cutting the proximal 25% of the superior check ligament up into the carpus region when performing this procedure via tenoscopy. Studies show favorable results: Of 332 horses, 70% returned to racing and did so more quickly and raced for longer than those treated non-surgically (Hu, A., et al. *JAVMA* 2014; doi: 10.2460/javma.244.12.1441].

Suspensory Ligament Fasciotomy

Of 155 horses in a 2015 study un-

dergoing fasciotomy and neurectomy (Dyson, S., et al *Equine Veterinary Journal* May 2012; doi: 10.1111/j.2042-3306.2011.00445.x], results were considered a success if the horse returned to work for more than a year.

All horses in the study had hindlimb proximal suspensory desmitis, but results varied according to structural conformation:

- Primary PSD and no abnormalities—78% returned to work for >1 year
- Primary PSD and straight hocks—44% returned to work for >1 year, but all remained lame.

Tenex Device

An experimental treatment currently under investigation relies on the use of an ultrasound probe with a 19-gauge needle that vibrates at 20,000 times a second to ablate tissue. Inserted directly into the lesion with ultrasound guidance, the probe also irrigates and aspirates away the ablated scar tissue. The process is similar to phacoemulsification of cataracts, said Levine. The procedure does not affect undamaged tendon tissue.

When used in humans for a variety of tendon/ligament issues, patients report 95% satisfaction and a faster return to function.

A study by Levine using this technique on horses between 2018 and 2020 reviewed 25 cases of superficial flexor tendon or suspensory ligament injury treated with the Tenex device, followed by injection of the lesion with PRP. Follow-up exam found good fiber alignment and quick resolution of significant lesions. More than 80% of patients have returned to work with no issues.

As yet, it remains to be seen what the reinjury rate will be; but so far, Levine feels this is a promising therapy for tendon and ligament injuries. **EM**

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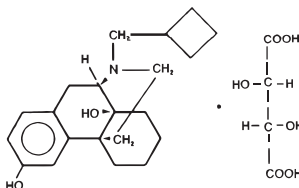
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Butorphic (butorphanol tartrate) Injection is a totally synthetic centrally acting, narcotic agonist-antagonist analgesic with potent antitussive activity. It is a member of the phenanthrene series. The chemical name is Morphinan-3, 14-diol, 17-(cyclobutylmethyl)-,(-), (S-(R*,R*))2,3-dihydroxybutanedioate (1:1) (salt). It is a white, crystalline, water soluble substance having a molecular weight of 477.55; its molecular formula is C₂₁H₂₉NO₂•C₄H₆O₆.

Chemical Structure:



Each mL of Butorphic Injection contains butorphanol base (as butorphanol tartrate, USP) 10 mg, 3.3 mg citric acid, USP, 6.4 mg sodium citrate, USP, 4.7 mg sodium chloride, USP, and 0.1 mg benzethonium chloride, USP, q.s. with water for injection, USP.

CLINICAL PHARMACOLOGY

Comparative Pharmacology

In animals, butorphanol has been demonstrated to be 4 to 30 times more potent than morphine and pentazocine (Talwin®-V) respectively.¹ In humans, butorphanol has been shown to have 5 to 7 times the analgesic activity of morphine and 20 times that of pentazocine.^{2,3} Butorphanol has 15 to 20 times the oral antitussive activity of codeine or dextromethorphan in dogs and guinea pigs.⁴

As an antagonist, butorphanol is approximately equivalent to nalorphine and 30 times more potent than pentazocine.¹

Cardiopulmonary depressant effects are minimal after treatment with butorphanol as demonstrated in dogs,⁵ humans^{6,7} and horses.⁸ Unlike classical narcotic agonist analgesics which are associated with decreases in blood pressure, reduction in heart rate, and concomitant release of histamine, butorphanol does not cause histamine release.¹ Furthermore, the cardiopulmonary effects of butorphanol are not distinctly dosage related but rather reach a ceiling effect beyond which further dosage increases result in relatively lesser effects.

Reproduction: Studies performed in mice and rabbits revealed no evidence of impaired fertility or harm to the fetus due to butorphanol tartrate. In the female rat, parenteral administration was associated with increased nervousness and decreased care for the newborn, resulting in a decreased survival rate of the newborn. This nervousness was seen only in the rat species.

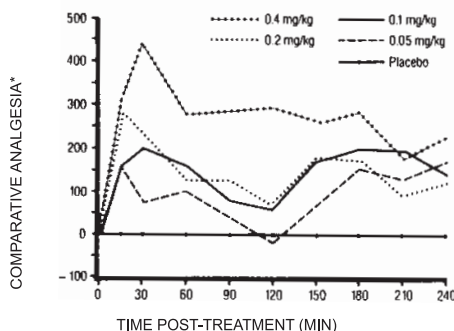
Equine Pharmacology

Following intravenous injection in horses, butorphanol is largely eliminated from the blood within 3 to 4 hours. The drug is extensively metabolized in the liver and excreted in the urine.

In ponies, butorphanol given intramuscularly at a dosage of 0.22 mg/kg was shown to alleviate experimentally induced visceral pain for about 4 hours.⁹

In horses, intravenous dosages of butorphanol ranging from 0.05 to 0.4 mg/kg were shown to be effective in alleviating visceral and superficial pain for at least four hours, as illustrated in the following figure:

Analgesic Effects of Butorphanol Given at Various Dosages in Horses with Abdominal Pain



*Pain threshold in butorphanol-treated colicky horses relative to placebo controls

A definite dosage-response relationship was detected in that butorphanol dosage of 0.1 mg/kg was more effective than 0.05 mg/kg but not different from 0.2 mg/kg in alleviating deep abdominal pain.

Acute Equine Studies

Rapid intravenous administration of butorphanol at a dosage of 2.0 mg/kg (20 times the recommended dosage) to a previously unmedicated horse resulted in a brief episode of inability to stand, muscle fasciculation, a convulsive seizure of 6 seconds duration, and recovery within three minutes. The same dosage administered after 10 successive daily 1.0 mg/kg dosages of butorphanol resulted only in transient sedative effects. During the 10 day course of administration at 1.0 mg/kg (10 times the recommended use level) in two horses, the only detectable drug effects were transient behavioral changes typical of narcotic agonist activity. These included muscle fasciculation about the head and neck, dysphoria, lateral nystagmus, ataxia, and salivation. Repeated administration of butorphanol at 1.0 mg/kg (10 times the recommended dose) every four hours for 48 hours caused constipation in one of two horses.

Subacute Equine Studies

Horses were found to tolerate butorphanol given intravenously at dosages of 0.1, 0.3, and 0.5 mg/kg every 4 hours for 48 hours followed by once daily injections for a total of 21 days. The only detectable drug effects were slight transient ataxia observed occasionally in the high dosage group. No clinical, laboratory, or gross or histopathologic evidence of any butorphanol-related toxicity was encountered in the horses.

INDICATIONS

Butorphic (butorphanol tartrate) Injection is indicated for the relief of pain associated with colic in adult horses and yearlings. Clinical studies in the horse have shown that butorphanol tartrate alleviates abdominal pain, associated with torsion, impaction, intussusception, spasmodic and tympanic colic, and postpartum pain.

WARNINGS

DO NOT USE IN HORSES INTENDED FOR HUMAN CONSUMPTION.

CAUTION

Butorphic Injection, a potent analgesic, should be used with caution with other sedative or analgesic drugs as these are likely to produce additive effects.

There are no well-controlled studies using butorphanol in breeding horses, weanlings, and foals. Therefore, the drug should not be used in these groups.

ADVERSE REACTIONS

In clinical trials in horses, the most commonly observed side effect was slight ataxia which lasted 3 to 10 minutes. Marked ataxia was reported in 1.5% of the 327 horses treated. Mild sedation was reported in 9% of the horses.

DO dosage

The recommended dosage in the horse is 0.1 mg of butorphanol per kilogram of body weight (0.05 mg/lb) by intravenous injection. This is equivalent to 5 mL of Butorphic Injection for each 1000 lbs body weight. The dose may be repeated within 3 to 4 hours but treatment should not exceed 48 hours. Pre-clinical model studies and clinical field trials in horses demonstrate that the analgesic effects of butorphanol tartrate are seen within 15 minutes following injection and persist for about 4 hours.

HOW SUPPLIED

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

NDC 59399-112-20

20 mL vial in package of one

STORAGE

Store at controlled room temperature 20° to 25°C (68° to 77°F). Protect from light.

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Behavioral Update

Understanding horse behavior research can help you better manage horses and modify owner behavior.

By Nancy S. Loving, DVM

Horse owners are “into” horse behavior. Your clients want you bringing science-based behavioral information to them. Check out research briefs here and view articles on EquiManagement.com.

The Effect of Nosebands

The training of horses tends to rely on negative reinforcement to modify a horse's behavior to the will of the rider. A restrictive noseband does not provide negative reinforcement because the pressure never relents or changes in response to a horse's behavior. Studies are currently evaluating the effect of restrictive nosebands on horse behavior.

While it is recommended that there be a two-finger available space beneath the noseband, a study of 750 horses ridden in dressage, eventing and performance hunter disciplines found that 44% of horses were fitted with a zero-fingers gap beneath the noseband and the horse's nose. Only 7% of horses were fitted properly with a gap of two fingers.

Another study concluded: “The current data indicate that nosebands tightened to the extent that there is no area available underneath them cause a stress response and prevent the expression of normal behavior.” Stress responses were measured by elevated heart rates and increased eye temperature as parameters suggestive of pain and/or discomfort.

When veterinarians are asked to examine horses for rider complaints of unwillingness to work or performance problems, headgear warrants inspection.

Pre-Conditioning for Learning

The use of negative reinforcement relies

on the appropriate release of pressure in response to a horse performing the requested task. Rein tension on the bit is one such means of applying negative reinforcement. Behaviorists have noted that horses learn better when they are slightly aroused and prepared for their lesson. By contrast, emotional reactivity (or fear) responses—such as those evoked by chasing a horse around a round pen—interfere with a horse's cognitive function.



GETTY IMAGES

A study presented at the 12th International Equitation Science Conference examined the effect of a pre-conditioning exercise—giving to bit pressure—on arousal level and learning outcome. Arousal was determined through heart rate and behaviors such as head tossing, while learning was measured by rein tension, time to perform the task, step number and behavior. The objective was to engage the horse in the lesson as a means to improve performance.

The study noted: “Effective use of negative reinforcement depends on timing the release of the applied pressure, and the difference between a *good* and an *average* trainer manifests chiefly in that ability.”

Twitching for Restraint

Sometimes it is necessary to use mechanical techniques to subdue a fractious horse for veterinary or farrier procedures. The lip twitch and ear twitch are examples of such restraint measures. It is speculated that a twitch can create analgesia, distraction or pain as a vehicle for obtaining cooperation from a horse.

Measurements of heart rate, heart rate variability and cortisol levels were used to evaluate the effects of twitch methods on a group of 12 horses in one study. The study reported considerable differences between using the lip or the ear twitch.

As the lip twitch increases the parasympathetic nervous system activity, the study found it reduces stress levels and “subdues through a calming, probably analgesic effect.” That said, the study also discovered that the lip twitch might be useful only for procedures lasting less than five minutes.

Ear twitch restraint is considered “a stressful and aversive mechanism, probably eliciting fear and/or pain,” reported the study.

Take-Home Message

Knowledge about equine behavior is important for managing horses and horse owners, managers or trainers. Teaching the people who regularly handle the horse what research is showing in the areas of behavior can increase your standing with your clients. **EM**



Back pain can be a primary or secondary issue faced by horses.

Back Pain Research

In one study, soft tissue injuries in the back were responsible for more than half of the issues the horse experienced.

By Nancy S. Loving, DVM

Many horse owners are concerned about back pain in their horses. Veterinarians know there are some primary back injuries or problems, and there are other issues that can cause secondary back pain. Here are some research studies that might help in your back pain decision tree.

Thoracolumbar Spine Problems

A Polish study compared the presence or absence of clinical signs of thoracolumbar pain with radiographic findings to identify bone pathology in the spine [Nenklewski, R. *Equine Back Disorders: A comparative study between palpation and radiographic findings. Translational Research in Veterinary Science* 2019, vol.

2, No. 1, pp. 41-49; DOI: <http://dx.doi.org/10.12775/TRVS.2019.003>].

Kissing spines (i.e., impinging and overriding spinous processes) commonly develop in the equine athlete. This study examined clinical and radiographic findings of 44 horses aged weanling to 18 years. Usage included dressage, show jumping and racing in 22 horses; 16 horses were used for pleasure and general purposes with irregular training. Six horses were not yet in steady work.

After assessing posture and muscle symmetry, the horses' backs were palpated and evaluated for mobility in dorsoventral and lateral planes. Lateral radiographs were taken of dorsal spinal processes of the thoracolumbar area.

About 36% of the horses were clinically and radiographically normal. Of

horses showing clinical signs of pain, only 4.5% had no bone pathology—the researchers speculated that pain came from soft tissue injury. Nearly 23% of horses had radiographic findings that correlated with clinical signs. Interestingly, 36.4% of those with no response to palpation had positive radiographic abnormalities of the spinous processes.

Not too surprisingly, the older the horse and the longer its use in athletics, the more likely the presence of pathological spinal changes. In the study's other finding, horses with infrequent training or those used for general purposes had thoracolumbar radiographic findings similar to active sport horses.

Back Disorders

Primary back disorders occur with

lesions in the spine and associated muscles, ligaments, vertebrae and nerves. Back discomfort is also considered a cause of secondary disorders in the axial skeleton. An accurate diagnosis of equine back pain is necessary to achieve effective management and therapy and palliative improvements. A Malaysian study identified 181 cases of equine back pain in horses aged 5-22 and investigated the anatomical location of the pain and treatment and outcomes [Mayaki, A.M.; Intan-Shameha, A.R., et al. Clinical investigation of back disorders in horses: A retrospective study (2002-2017). *Veterinary World* Mar 2019, vol. 12; EISSN: 2231-0916].

Most complaints centered on poor performance, muscle soreness, stiffness, muscle atrophy, evidence of fractured spinous processes or other vertebrae, overriding dorsal spinous processes (kissing spines) and poor saddle fit. The

cases were separated into groups based on duration:

- Acute problems, if less than a week in duration, occurred in about 41%.
- Chronic problems, if more than a week in duration, occurred in about 52%.
- Recurrent problems, if pain returned or didn't respond to treatment, occurred in nearly 7%.

Primary back disorders occurred in 92%, and of the secondary lamenesses, 2.2% developed forelimb lameness and 5.5% developed hindlimb lameness. This study did not find a strong correlation between back pain and concurrent lameness.

All but three of the horses experienced pain within the thoracolumbar region; the three had lumbosacral pain.

Soft tissue lesions predominated in about 57%—these occurred mostly in epaxial muscles, especially the longissimus dorsi muscle and also in the dorsal

sacroiliac ligaments. Vertebral lesions were present in 31 horses (18%) mostly due to kissing spines, and about 10% related to spondylosis, 6.5% to osteoarthritis, and 3% from fracture of the dorsal spinous process. Kissing spines particularly developed in areas beneath the saddle.

Tack-associated problems were identified in almost 17% of the cases. Neurological lesions from spinal injury or compression were present in 7%.

Of 157 horses available for follow-up, 15% improved spontaneously without any treatment. Following treatment in the others, 62% experienced complete recovery from soft-tissue lesions and tack-associated problems. About 38% did not improve and of those that died or were euthanized, the most prevalent pathologies were kissing spines, osteoarthritis or compressive myelopathic lesions. **EM**

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