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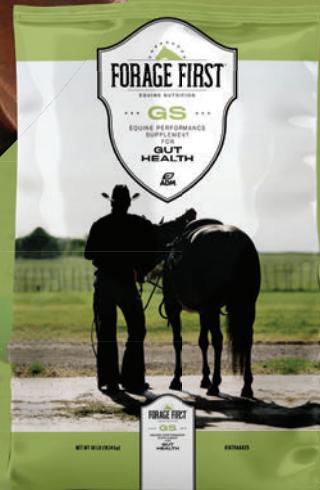


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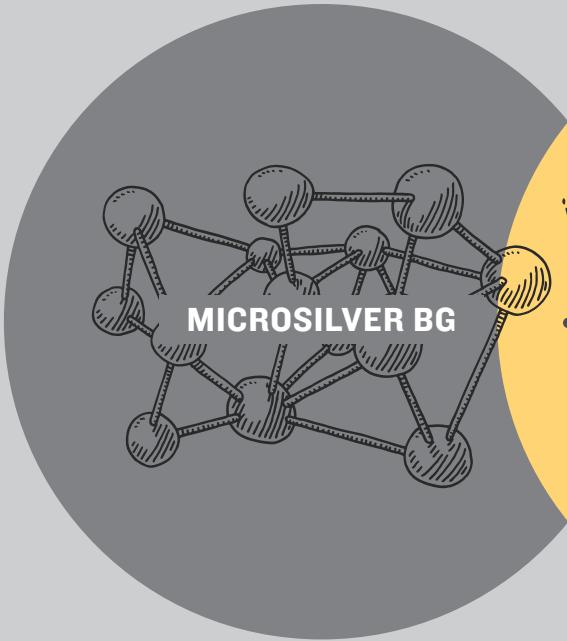
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Welcome to 2022!

By Kimberly S. Brown

I believe this will be a benchmark year for the equine veterinary industry in recognizing current challenges and creating solutions to ongoing issues. What do you think?

- I think practices will continue to see high demand for services (which is a double-edged sword, with veterinarians being more profitable while trying to do more with less help).
- I think there will continue to be a shortage of veterinarians entering the equine veterinary sector—more demand for equine vets than supply.
- I think senior veterinarians will continue to retire, leaving even bigger gaps in service availability to horse owners in some regions.
- I think the prices that horse owners pay for veterinary services will increase multiple times in the next few years to keep up with demand for those services.
- I think younger equine vets will tend to choose solo practice or will find established practices that have modernized what it means to be an equine veterinarian.
- I think vet techs and assistants will become critical to equine veterinary practice in every sector (solo and group practices).
- I think veterinarian mental health and well-being will remain in the forefront of discussions of what needs to be addressed in the equine veterinary industry.
- I think starting salaries for new equine veterinarians will increase, while at the same time mentorship to learn necessary practice skills will also need to increase.
- I think business education (live and on-demand) will become critical to new



- and established veterinary practices.
 - I think continuing education on all topics will become more accessible to all veterinarians, whether live in-person, live virtual, on-demand or a combination of these offerings.
 - I think improved technologies will become critical for not only the care of horses, but for the financial ease of doing business.
 - I think the idea of “work/life balance” will become the foundation of future veterinary practices, and those leading the way with alternative work schedules for equine veterinarians will be bellwethers for how the equine veterinary industry evolves.
 - I think business skills will become as important as equine health skills in successful equine veterinary practices.
 - I think with the realization and changes that are being made today—and that are coming in the near future—the equine veterinary industry will see an uptick in those graduating practitioners who want to be in equine practice in the next five years. I also think that some of those equine practitioners who left for other careers will come back to equine practice as the new paradigm takes over the industry.
- Most of these thoughts are based on studies, surveys, roundtable discussions and personal observations of leaders in the equine veterinary industry. There are some scary bullet points in the list above, but I firmly believe that if the equine veterinary industry can recognize the challenges and come up with sustainable solutions, these problems can be not only addressed, but solved. **EM**



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Equine Asthma Risk Factors

Being able to identify risk factors for a disease process can help horse owners and veterinarians formulate mitigation strategies. Equine asthma is a common condition in horses, in part due to environmental assaults on the respiratory tract. Compromise of the respiratory tract is costly for horse welfare and for performance. A retrospective study at Texas A&M University looked at a variety of potential risk factors in equine asthma patients [Thomas, S.J.; Navas de Solis, C.; Coleman, M.C. Case-Control Study of Risk Factors for Equine Asthma in Texas, *Journal of Equine*

to the age of a respiratory horse case.) Horses were admitted to Texas A&M Veterinary medical Teaching Hospital from January 2014 to December 2018.

Horses in the study were documented with at least two conditions of less than six months' duration: exercise intolerance, coughing, respiratory rate ≥ 24 breaths per minute, increased respiratory effort at rest, or nasal discharge. Cytology of respiratory secretions from bronchoalveolar lavage fluid supported a diagnosis of equine asthma.

Data examined in the study included signalment, use/activity level, dietary management, stable management, previ-

to have an association with obesity.

In summary, the authors concluded that development of asthma in horses is possibly linked to obesity.

Pre-Loading with Electrolytes

Horses exercising for extended durations at submaximal efforts often lose significant quantities of fluid and electrolytes in their hypertonic sweat. During endurance exercise, these equine athletes need regular supplementation of salts and ample water intake.

A study examined the effects of providing large volumes of fluid and electrolytes prior to exercise [Waller, A.P. and Lindinger, M.I. Pre-loading large volume oral electrolytes: Tracing fluid and ion fluxes in horses during rest, exercise, and recovery. *Journal of Physiology* July 2021; <https://doi.org/10.1113/JP281648>].

University of Guelph researchers administered a balanced hypotonic electrolyte supplementation containing radiotracer sodium and potassium ions in eight liters of water given through a nasogastric tube. They found that rapid absorption achieved plasma levels peaking at 45 minutes. After one hour, the ions were distributed to the extracellular space (ECF) and intracellular fluid (ICF). Nearly all sodium was sequestered in the extracellular blood compartment and the potassium was taken up into the intracellular skeletal muscle compartment by two hours of recovery.

Four healthy horses were included in the study, all previously conditioned to progressive exercise improvements over a four-month period. Each experiment was conducted in all the horses with two weeks separating each trial. The potassium evaluation took place about six months following the sodium trials.

Each experimental trial began with administration of electrolyte supplementation about four hours after a morning feed, followed by exercise one



ISTOCK

The authors of this study concluded that development of asthma in horses is possibly linked to obesity.

Veterinary Science 2021; doi: <https://doi.org/10.1016/j.jevs.2021.103644>].

Cases with respiratory disease, as well as two groups of controls—age-matched and temporal, with no respiratory issues—consisted of 37 individuals in each group. (A temporal control was older than a year and presented to the hospital within 72 hours for reasons other than respiratory illness either current or past. An age-matched control was admitted within two years of the incident that brought the horse to the hospital but was also free of any current or past respiratory disease while equivocal

ous history of diagnosis and/or clinical signs of metabolic disease, and complete physical exam findings.

An overweight body condition was found to have a significant association with development of equine asthma compared to horses in a healthy body condition. Gender and age did not have a direct correlation. Environmental and stabling factors, while critical to respiratory health, were not provided in sufficient detail to the medical history in the study so were not found to be as significant as body condition.

Interestingly, human asthma is found



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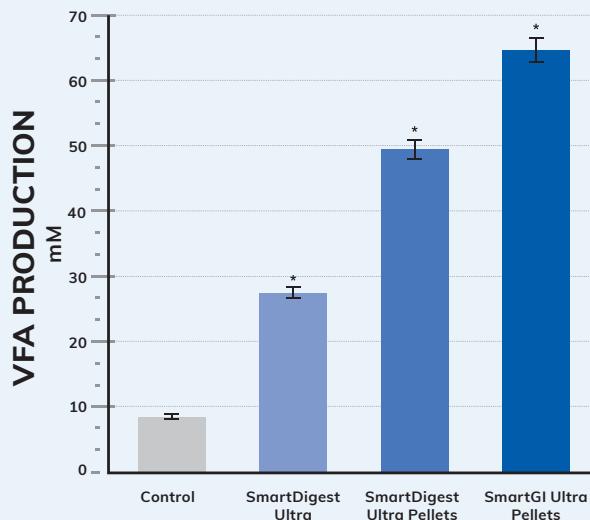
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hour later. A radiotracer was injected via an intravenous catheter one hour prior to start of exercise. Ingredients of the administered powdered electrolyte (Perform'N Win by Buckeye Nutrition) included sodium chloride, potassium chloride, magnesium sulfate, dextrose, sucrose, calcium citrate, fumaric acid and citric acid.

A sweat wrap was placed around the barrel of each horse 30 minutes prior to start of exercise to facilitate collection of sweat. Ten minutes before exercise, a muscle biopsy was obtained from the gluteus medius muscle. Horses performed exercise under controlled indoor conditions of 68-73.4 degrees Fahrenheit and 50-65% humidity. After walking for five minutes, the treadmill speed was increased to 5.5 mph, then to an intensity designed to maintain a working heart rate that approximates 30-34% of peak VO₂ for sodium and 50% of peak VO₂ for potassium. The average speed of 6.7-9 mph on a 1.5-degree incline pushed the horses to a point of voluntary fatigue in which they were unable to keep up with belt speed. A hi-speed fan continually blew air at the horse during roughly 105 minutes of exercise.

Blood and sweat were analyzed from pre-exercise rest, during exercise and during recovery. Body weight taken prior to and after exercise helped to calculate body water losses at rest, at end of exercise and after two hours of recovery. The horses were not allowed to drink until the end of sampling post-exercise.

The authors concluded:

- Pre-loading with two gallons of electrolyte supplementation in water an hour prior to the start of exercise facilitated an increase in exercise duration and sweating despite continuing sweat losses of fluids and electrolytes.
- Compared to plain water, an electrolyte supplement better maintained

plasma volume and ECF volume during submaximal exercise.

Electrolyte supplementation also increased sweat losses of sodium, potassium and chloride.

In conclusion: Electrolyte supplementation in two gallons of water one hour prior to exercise allows uptake of water and ions by muscles and soft tissues to attenuate body fluid losses and to maintain sweating rates. This has the potential to improve cellular function and thermoregulation during exercise.

Protection Against *R. equi*

Rhodococcus equi is an intracellular bacterium that causes devastating respiratory disease in foals and is difficult to control. Presently, no vaccine is available. Plasma transfusions might be preventive but are costly and time-consuming. Use of macrolide antibiotics is discouraged due to the potential for development of antimicrobial resistance and possible poor efficacy.

Studies at Texas A&M College of Veterinary Medicine and Biomedical Sciences explored a potential means of improving a foal's success at challenging infection [Cohen, N.D.; Kahn, S.K.; Cywes-Bentley, C.; et al. Serum antibody activity against poly-N-acetyl glucosamine (PNAG), but not PNAG vaccination status, is associated with protecting newborn foals against intrabronchial infection with *Rhodococcus equi*. *Microbiology Spectrum* 2021, 9:e00638-21; <https://doi.org/10.1128/Spectrum.00638-21>].

In a previous study, mares were immunized at six and three weeks prior to parturition with a conjugate vaccine (not yet licensed) "targeting the highly conserved microbial surface polysaccharide, poly-N-acetyl glucosamine (PNAG)." PNAG is a conserved surface antigen found especially on intracellular microbes, like *R. equi* [Cywes-Bentley, C.; Rocha, J.N.; Bordin, A.I.; et al.

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

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

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

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

STORAGE CONDITIONS: Store at or below 8° C.

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Antibody to Poly-*N*-acetyl glucosamine provides protection against intracellular pathogens: Mechanism of action and validation in horse foals challenged with *Rhodococcus equi*. *PLoS Pathog* 2018, 14(7): e1007160. <https://doi.org/10.1371/journal.ppat.1007160>].

Foals obtain the antibodies through colostrum and showed good protective antibody response to challenge at 28 days—91% born to vaccinated mares were protected against *R. equi* pneumonia, whereas 86% of non-vaccinated controls developed pneumonia.

The more recent study sought to evaluate protection with this protocol in foals younger than 6 days old since they are often exposed at birth due to the presence of this bacteria in the environment. The results indicated that “vaccination of mares did not significantly reduce the incidence of pneumonia in foals; however, activities of antibody against PNAG or for deposition of complement component onto PNAG was significantly higher among foals that did not develop pneumonia than among foals that developed pneumonia.”

The research also showed that “Vaccination of mares against PNAG protected their 28-day-old foals against intrabronchial infection with virulent *R. equi*, but vaccination of mares failed to protect foals against intrabronchial infection with *R. equi* at age 6 days.” This is possibly due to reduced complement activity and functional neutrophil responses in foals less than a week of age compared to slightly older foals. Complement increases killing effects of neutrophils and lymphocytes on *R. equi*.

More investigation is needed for a potential PNAG vaccine under field conditions to determine if its efficacy is useful for foals against *R. equi* in their first week of life.

Dissolving Enteroliths with Coke

In some areas, enteroliths can be a common cause of colic and subsequent intestinal surgery. Besides dietary management, nutritional components have been tried to help with dissolution of these mineralized salts. A Brazilian study compared multiple products *in vitro* to see if any substance has the potential to help manage enteroliths [Gil, S.A.V.; Marulanda, J.J.P.; Aranzales, J.R.M. *In vitro* evaluation of the dissolving effect of carbonated beverages (Coca-Cola) and enzyme-based solutions on enteroliths obtained from horses: pilot study *Braz J Vet Res Anim Sci*. 2021; 58:e182579; doi.org/10.11606/issn.1678-4456.bjvras.2021.182579].

The enteroliths in the study were obtained from horses undergoing celiotomy for their removal. Six fragments of the most compact surface of six enteroliths were studied. Six different formulations of carbonated drinks and enzyme-composed solutions were used *in vitro* at a pH of 7.1 to simulate a typical intestinal environment. Once immersed, each fragment was evaluated for disintegration at times 0, 3, 12, 24, 36, 48, 60 and 72 hours: T1: Coca-Cola; T2: Coca-Cola Zero; T3: Distilled water + papain and cellulase; T4: Coca-Cola + papain and cellulase; T5: Coca-Cola Zero + papain + cellulase; T6: Distilled water as control.

All treatments maximally disintegrated at 72 hours, with T4, T5 and T1 having the highest percentage of disaggregation. T5 had the greatest statistical difference.

Coca-Cola has a low pH (2.6), similar to gastric juices. The enzymes of papain and cellulase potentiate the dissolving effect of the carbonated solution. This info might be helpful in conducting future trials on managing equine enteroliths. **EM**

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

Value of an Ambulatory Assistant

Almost one out of five equine practices do not have any employees. In fact, more than 35% of equine practices have only one doctor, so it is likely that many of those solo practitioners are doing everything themselves—stocking the truck at the end of a long day, filling out lab submission forms, finishing medical records in the evening after the kids are in bed or catching up on posting content to their practice social media sites on weekends between emergencies.

Imagine how much time you could free up in your day if you had some help with these tasks. Unbelievably, there are also large referral practices with ambulatory divisions that do not provide their doctors with assistants, despite the advantages of doing so.

Having an assistant has many benefits. Tasks that do not require a veterinary degree can often be delegated to a well-trained employee. These can include keeping the practice vehicle stocked, cleaned and properly maintained, as well as counting inventory, archiving images and taking care of equipment. An assistant can also serve as the driver, leaving time for the doctor to make call-backs, look up histories or write medical records, lab submissions or invoices. Or if the veterinarian prefers to drive, the as-

sistant can often take care of these tasks with training. A well-trained assistant can schedule your appointments, teach a client how to wrap a foot, perform stall-side laboratory tests and much more!

Safety increases markedly when a well-trained employee, rather than an owner, handles the patient—especially when



GETTY IMAGES/ISTOCKPHOTO

that owner is not an adult. When invoices are written, it is very common for a second set of eyes to find missed charges, and assistants are remarkably supportive of the value provided by the veterinary team, which reduces discounting. The efficiencies of having someone to set up and put away diagnostic equipment, do sterile prep for procedures and assist in field surgeries are priceless.

Affording an assistant might seem difficult, but with a modest increase in prices, it is doable if you avoid employee

overtime. With an hourly wage of \$15 for 40 hours a week (four 10-hour days) for 52 weeks, the total wages would be \$31,200. With the addition of payroll taxes and workers' compensation insurance costs of about \$4,056, the yearly cost would be \$35,256. If your gross revenue production was currently \$350,000 and you instituted a fee increase of 10%, that would increase your revenue by \$35,000—enough to pay for help. As a bonus, the efficiencies of having someone to do the non-veterinary tasks could free you up to do more billable work, and the decrease in missed charges and discounts could add to your bottom line.

Having help in the truck can raise the amount of revenue you earn quite dramatically.

Having companionship during long days can also help you feel more connected and less stressed. The last two years have seen strong increases in service demand by clients, with increased revenue, visits and emergencies. Equine veterinarians are tired and are finding it hard to keep going at this relentless pace. Meeting the needs of clients and patients can be made easier with the efforts of a team. Don't hesitate to hire an assistant—you deserve the help! **EM**

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AAEP 2021 Convention DJD Sunrise Session

Dr. Rick Mitchell gives an overview of the 2021
AAEP Sunrise Session on degenerative joint disease (DJD).

By Kimberly S. Brown

At the 2021 American Association of Equine Practitioners (AAEP) Sunrise Session brought to you by American Regent Animal Health, Drs. Rick Mitchell and Kyla Ortved presented on “Redefining DJD Diagnosis, Refining Treatment and Mastering Client Communication, Presented by American Regent Animal Health.” American Regent is the maker of Adequan® i.m. (polysulfated glycosaminoglycan).

Mitchell, DVM, MRCVS, DACVSMR, is an owner of Fairfield Equine Associates and a founding member of ISELP. He has been an attending veterinarian at six Olympic Games during his career. Ortved, DVM, PhD, DACVS, DACVSMR, is the Jacques Jenny Endowed Term Chair of Orthopedic Surgery at the University of Pennsylvania’s New Bolton Center. Both had served on a panel discussion of equine practitioners to discuss degenerative joint disease (DJD)—a major cause of lameness in horses. (*Editor’s note: You can read the complete report on this roundtable discussion by visiting EquiManagement.com and searching for “Managing DJD in Horses.”*)

We had a chance to catch up with Mitchell after the AAEP Convention to ask him about the highlights of the Sunrise Session presentation on degenerative joint disease (DJD).

Defining DJD: Mitchell said that in the AAEP Sunrise Session, he and Ortved first defined DJD for the audience. He said some of the key points were that initial inflammation is related to trauma or wear; and that degeneration of articular cartilage occurs in response to that inflammation, which results in changes in synovial membranes, hypertrophy of joint margins and changes in the subchondral bone in the body’s effort to try and stabilize things. Eventual loss of articular cartilage due to enzyme degradation results in osteoarthritis (OA).

The team showed slides of cases ranging from mild to severe throughout the presentation.

Diagnosing and Treating DJD: “Our goal is to try to slow the disease process, manage the current damage, and possibly correct or modify the inciting cause of the issue in the first place,” said Mitchell. “Continued maintenance is often necessary.”

By “maintenance,” Mitchell said he means the use of appropriate chondroprotective

and regenerative agents that will reduce further degradation of articular cartilage.

Mitchell said he and Ortved then discussed how early diagnosis of DJD is important but challenging. Initially there might be no radiographic signs of damage, but horses can be lame, said Mitchell. The horse can have varying degrees of joint effusion or joint enlargement. “Lameness can be variable, from very minimal to very severe ... depending on damage,” he added.

Mitchell and Ortved talked about the importance of the physical examination and not “honing in” on one thing or one leg, but to look at the whole horse. Mitchell gave the specifics of a hands-on exam and diagnostic modalities used with the horse in-hand and under saddle. He reminded the audience that “diagnostic analgesia is not as specific as we might have been taught in vet school; in fact, it regionalizes the source of lameness, but it does not identify the source of lameness.”

In the Sunrise Session they talked about the various diagnostic imaging techniques available, including the value of alternative imaging such as a standing CT. “There are too many horses with degenerative

joint disease, and we don’t want to put them all under anesthesia,” stated Mitchell. “There is a lot of work going on to try and perfect the standing CT,” he added. “The recumbent CT that they use in humans and some horses is proven technology, but it requires general anesthesia. And we all know there are inherent risks to general anesthesia of the horse.”

Therapies for DJD:

Mitchell said they talked about conservative therapies to try and control inflammation in the joints. “Systemic Adequan (polysulfated glycosaminoglycan) administration [which is included in those therapies] has been demonstrated through research and studies to modify disease,” said Mitchell. “It stimulates cartilage matrix synthesis, and it inhibits metalloproteinase enzymes; it promotes hyaluronic acid synthesis, has an anti-inflammatory effect, it inhibits PG2 and free radicals, and it’s recommended earlier in the disease due to its protective effects.

“So, if you’ve got a horse with mildly inflamed joints that hasn’t really deteriorated, it’s the optimum time to use a product such as Adequan,” Mitchell said.

He said they also talked about how intra-articular injections might be complemented by the use of Adequan. In addition, Mitchell noted that he and Ortved spoke about the use of corticosteroids, hydrogels, regenerative medicine and surgical options. He said that Adequan is a complementary agent to many of those treatments.



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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.

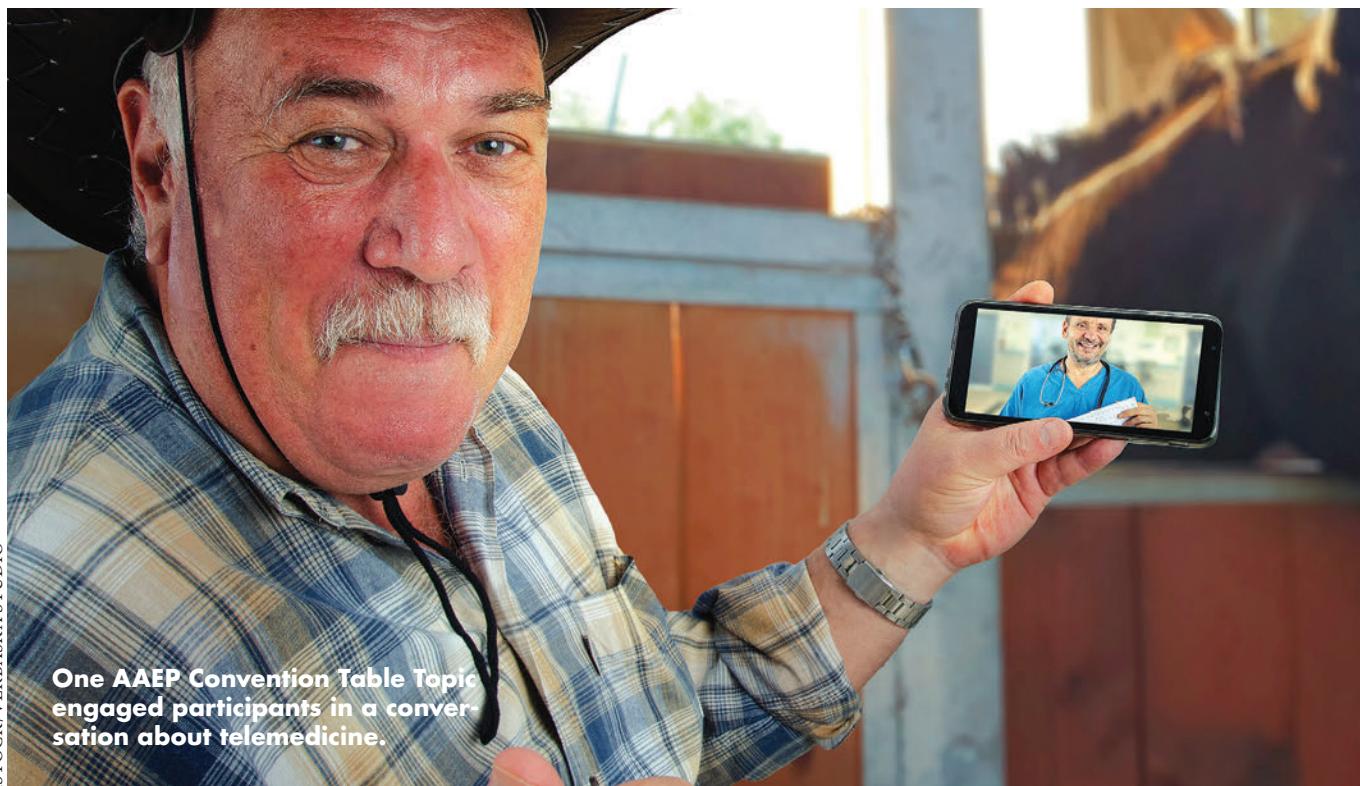
4 Kim DY, Taylor HW, Moore RM, Paulsen DB, Cho DY. Articular chondrocyte apoptosis in equine osteoarthritis. *The Veterinary Journal* 2003; 166: 52-57.

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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One AAEP Convention Table Topic engaged participants in a conversation about telemedicine.

AAEP Convention Medical Coverage

Coverage of equine medicine-related topics from the 2021 AAEP Convention can be found here and online, courtesy of American Regent Animal Health.

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ANIMAL HEALTH

By Nancy S. Loving, DVM

After missing a year of in-person gathering, the American Association of Equine Practitioners (AAEP) convened in Nashville, Tennessee, for the 2021 AAEP Convention. For those who didn't yet feel comfortable gathering in person or whose schedules didn't allow travel to attend the in-person gathering, AAEP offered on-demand CE for registrants.

EquiManagement and American Regent Animal Health teamed up to bring you not only this article, but six original articles on different AAEP Convention presentations that were posted on EquiManagement.com in January, February and March. We invite you to check those out if you missed any of them.

Kester News Hour

At the 2021 AAEP Convention, recent

journal papers were discussed during the Kester News Hour by a panel of veterinary experts on the topics of Medicine, Surgery and Reproduction. Katie Garrett, DVM, DACVS-LA, of Rood & Riddle Equine Hospital and Sherry A. Johnson, DVM, MS, DACVSMR, addressed surgical and orthopedic papers while Amy Johnson, DVM, DACVIM-LAIM and Neurology, of New Bolton Center, focused on medicine topics.

Reproduction topics are covered in a separate article on page 66.

Surgical and Orthopedic Topics **Septic Arthritis in Foals and** **Future Racing Performance**

Garrett reviewed a paper about survival and racing performance in Thoroughbred foals following a bout with septic arthritis [O'Brien, T.J.; Rosanowski, S.M.; Mitchell, K.D.; et al. Factors associated with survival and racing performance of 114 Thoroughbred foals with septic arthritis compared with maternal siblings (2009-2015). *Equine Vet J* 2020; <https://doi.org/10.1111/evj.13387>].

Lameness and synovial effusion of 114 foals were treated with articular lavage and antimicrobial drugs—78% were discharged while 22% were euthanized. Of the euthanized foals, 93% had concurrent osteoarthritic disease, which increased the risk of euthanasia 6.5-fold. The study demonstrated that a foal younger than 26 days old with concurrent disease is at a higher risk and is less likely to survive.

The authors noted that neither the difference in synovial fluid parameters at admission nor the number of synovial structures involved had any association with survival. If a foal survived to discharge from the hospital, it had a good chance of performance success. There was no difference in racing performance for survivors compared to siblings without septic arthritis.

Biomarker Test for Septic Arthritis

A prototype of a stall-side diagnostic test using enzymes as biomarkers is being evaluated to differentiate between septic and aseptic joint disease [Haralambus, R.; Florczyk, A.; Sigl, E.; et al. Detection of synovial sepsis in horses using enzymes as biomarker. *Equine Vet J* 2021; <https://doi.org/10.1111/evj.13459>]. The test measures lysozyme activity, which increases significantly in a septic joint. This enzyme has 100% sensitivity and specificity. It also might provide value to differentiate a post-

injection joint flare from a joint that has developed sepsis.

Mesenchymal Stem Cells Donor **Cross-Matched with Recipient**

Two studies involving therapy using mesenchymal stromal cells (MSC) were reviewed by Garrett. In the first study [Rowland, A.L.; Miller, D.; Berglund, A.; et al. Cross-matching of allogeneic mesenchymal stromal cells eliminates recipient immune targeting. *Stem Cells Transl Med* 2021; DOI: 10.1002/sctm.20-0435], she noted that autologous cells take weeks to culture and expand before one can start treatment, whereas allogeneic cells can be held in storage, ready for immediate use. While deemed safe, allogeneic cells have not yet been shown to be efficacious. One reason for this is due to potential incompatibility of the major histocompatibility complex (MHC) between donor horses and a recipient that elicits MSC death by the recipient's immune response.

In this study, fetlock joints were injected with 10 million MSCs four weeks apart—they were injected with either autologous cells, MHC-matched donors and recipient, or MHC-mismatched donor and recipient. The contralateral joint of each horse was injected with cryopreservation media as a control. Serum and synovial fluid were collected at multiple time points from each joint.

Joints with mismatched donor cells developed minor effusion and periarticular soft tissue swelling after the second injection due to local inflammation and activation of the horse's immune system. In contrast, inflammatory cytokine expression in autologous and MHC-matched joints were similar and minimal. Lymphocyte death was minimal in MHC-matched synovial fluid compared to up to 100% death in MHC-mismatched synovial fluid.

In both the autologous-treated and MHC-matched joints, endogenous MSCs were recruited. To maximize success using MSC therapy, the donor and recipient must be MHC-matched. This

process takes a week to perform and is not widely available.

MSC Preparation with Fetal **Bovine Serum versus Bone** **Marrow Supernatant**

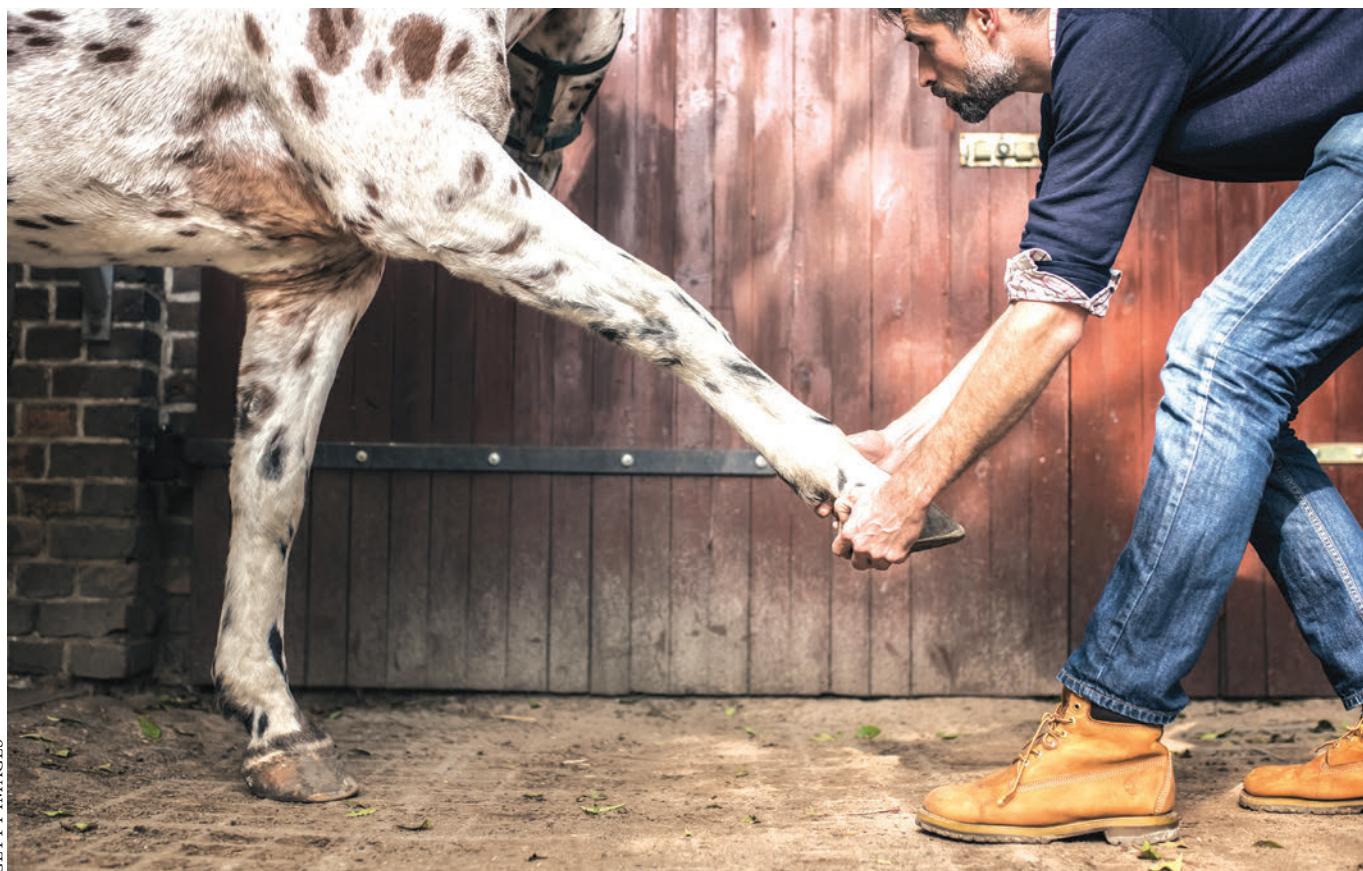
Garrett then described a study that used autologous MSC prepared with fetal bovine serum (FBS) [Rowland, A.L.; Burns, M.E.; Levine, G.J.; et al. Preparation technique affects recipient immune targeting of autologous mesenchymal stem cells. *Frontiers Vet Sci* 2021; DOI: 10.3389/fvets.2021.724041]. The FBS-containing product led to >80% of antibody-mediated MSC death *in vitro*. There was minimal death of MSCs when prepared with bone-marrow supernatant. The authors conclude that FBS is present in many vaccine preparations and therefore horses already have anti-FBS antibodies in their systems. An option is to use autologous serum instead of FBS-containing media.

Deep Digital Flexor Tendon Lesions

Sherry Johnson discussed a paper on deep digital flexor tendon lesions that are identified in 21-83% of lamenesses localized to the foot [Acutt, E.V.; Contino, E.M.; Frisbie, D.D.; et al. Deep digital flexor tendon lesions in the pastern are associated with the presence of distal tendinopathy. *Equine Vet J* 2021; DOI: 10.1111/evj.13470]. Distal DDFT lesions were found in 75% of pastern DDF tendinopathy and in 97% of core DDFT pastern lesions. The authors concluded that DDF tendinopathy in the pastern, especially core lesions, is associated with distal tendinopathy within the hoof capsule.

Navicular Bursal Injection

Different techniques of navicular (podotrochlear) bursal injections are of interest to equine practitioners to be able to facilitate treatment and success in their patients. Garrett reviewed a comparison of different approaches to the podotrochlear bursa [Espinoza-Mur, P.; Whitcomb, M.B.; Kass,



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Getting horses used to "pre-rehabilitation" exercises, people, equipment and environment can mean a greater success in post-surgical rehabilitation.

P.H.; et al. Factors affecting successful ultrasound-guided injection into the podotrochlear bursa using a palmaro-lateral approach. *Vet Surg* 2021; DOI: 10.1111/vsu.13713]. Radiographic-guided injection of the podotrochlear bursa has a high success rate for the palmar approach, but the needle enters the deep digital flexor tendon (DDFT). With a lateral approach, the needle might enter the DDFT, the digital sheath and/or the coffin joint. An ultrasound-guided approach is more technically challenging, but it has a high success rate for the palmar approach and a low success rate for a lateral approach.

The study looked at using the palmaro-lateral approach with ultrasound guidance as a technique that does not penetrate the tendon. Success relied on operator experience, limb position, bursal distention and visibility of the

suprasmoidian region in each limb position. Overall, the success rate was 58% (75% for an experienced practitioner and 41% for a less-experienced practitioner). The authors recommended reserving the palmaro-lateral approach for cases with excellent visibility of the suprasmoidian region. However, the authors noted that accurate and precise deposition of therapeutic material might be more important clinically than concern about needle penetration of the DDFT.

Current Use of Joint Therapies

Sherry Johnson reported on current clinical use of joint therapies comparing two AAEP surveys of 2009 and 2019 [Zanotto, G.M.; Frisbie, D.D. Current joint therapy usage in equine practice: changes in the last 10 years. *Equine Vet J* 2021; DOI: 10.1111/evj.13489]. Gustavo

Zanotto, DVM, PhD, DACVSMR, of Texas A&M University, further fine-tuned the data of the survey.

Out of 407 survey responses, the following results were identified:

- Triamcinolone was the most commonly used steroid for high-motion joints; practitioners were limiting injections to 18 mg per horse treatment. Many were restricting the dose to 5-10 mg for a single joint.
- MPA (methylprednisolone) was used more in 2019 for low-motion joints compared to its more regular use in 2009 in high-motion joints.
- Biologic joint treatments were used more often in 2019 than in 2009, with the majority stating there were benefits—on a scale of 0-5, the consensus rated benefits as a 4. IRAP was used by 83%, PRP by 75% and bone marrow mesenchymal cells by 22%. (In 2009,

- only 58% were using IRAP.)
- Reasons for choosing biologic treatment over corticosteroid injections were varied: 22% report greater safety; 48% report long-term efficacy; and 12% do so based on client request. These treatments have increased in popularity and there is an expectation of good efficacy.
 - Concomitant use of antimicrobial drugs became more common in 2019 than 2009. This is interesting because of new light shed on chondrolytic properties of amikacin, low reported incidence of septic arthritis following injection, and also due to ongoing concerns about antimicrobial resistance.
 - Many practitioners surveyed (37.6%) used antibiotics with corticosteroid joint injections, and others (38.1%) used antibiotics due to poor environmental conditions. About 37% of practitioners used antimicrobial treatment in joints except when using biologic treatment. Only 16% of practitioners said they never used AMDs in intra-articular treatment.
 - Frequent joint treatment is considered by 66.4% to be an industry problem. Most (50%) believe there should be at least six months between treatments while 30% feel that a three-month interval is OK.
 - The best responses to corticosteroids are considered to be in the distal hock joints, coffin joint and fetlocks. The best responses to biologic treatment are considered to be in the fetlocks, stifles and coffin joints.

Medicine Topics

Amy Johnson discussed management of EHV-1 outbreaks at FEI events, namely three FEI events on the Iberian Peninsula for jumpers in September 2021 and a June 2021 outbreak at a 31-horse barn in Pennsylvania.

Historically, EHV-1 has been described as neuropathogenic (D752) to develop EHM whereas non-neuro-

pathogenic EHV-1 (N752) is more often associated with abortion. She referenced multiple articles (listed below) that examined the current outbreaks and identification of a likely mutation in EHV-1: H752.

All horses in the outbreaks in Spain were infected with the “non-neuropathogenic” genotype N752. However, the Pennsylvania outbreak could not be differentiated as neuropathogenic or non-neuropathogenic because it involved a newer genotype: H752.

In a study of 65 EHV-1-infected horses, half had D752 and half had N752.

All the horses had similar clinical signs regardless of genotype—lethargy, fever and ataxia—and there were no differences in survival.

The take-home message is to treat all cases of EHV-1 seriously because calling one strain over another as neuropathogenic is probably a misnomer. For more details, the following references are available:

- Management of an EHV-1 outbreak at FEI events and its international impact. *Vet Rec* 2021; DOI: 10.1002/vetr.905
- Sutton, G.; Normand, C.; Carnet, F.; et al. Equine herpesvirus 1 variant and new marker for epidemiologic surveillance, Europe, 2021. *Emerg Infect Dis* 2021; DOI: 10.3201/eid2710.210704. PMID: 34546162
- Vereecke, N.; Carnet, F.; Pronost, S.; et al. Genome sequences of equine herpesvirus 1 strains from a European outbreak of neurological disorders linked to a horse gathering in Valencia, Spain, in 2021. *Microbiol Resour Announc* 2021; DOI: 10.1128/MRA.00333-21. PMID: 34016681
- Pusterla, N.; Barnum, S.; Miller, J.; et al. Investigation of an EHV-1 outbreak in the United States caused by a new H752 genotype. *Pathogens* 2021; DOI: 10.3390/pathogens10060747
- Pusterla, N.; Hatch, K.; Crossley, B.; et al. Equine herpesvirus-1 genotype

did not significantly affect clinical signs and disease outcome in 65 horses diagnosed with equine herpesvirus-1 myeloencephalopathy. *Vet J* 2020; DOI: 10.1016/j.tvjl.2019.105407

Equine Athletic Rehabilitation

An impressive panel of equine veterinarians and human physical therapists collaborated on their presentations about translatable strategies used in human rehabilitation programs that have potential for application in horse injuries. Following are some of the highlights.

Non-Operative Strategies

Stephania Bell, PT, OCS Emeritus, CSCS, described current non-operative strategies used for the highest level of human athletes in professional sports. Sherry Johnson discussed some exciting methods in which these same strategies might help with recovery in equine athletes.

Historical efforts to restore muscle strength of soft tissue injuries relied on repetitive exercises (reps) at 75-85% of optimal strength over a 12-16-week period. Not only was this procedure painful, but many older patients couldn't tolerate it. In addition, it proved ineffective for improving muscle strength. Japanese research 20 years ago looked at a method of altered blood flow as a means of improving muscle function. Human rehabilitation programs starting using “blood flow restriction” (BFR) therapy as a critical non-operative strategy. For veterans with blast trauma of the limbs, this technique was attempted in an effort to avoid amputation.

It works like this: A cuff on a proximal part of a limb is inflated to the point of reducing arterial blood flow by 80% and venous blood flow by 100%. While the cuff is in place, the patient performs 30 reps of a particular exercise. Vascular occlusion for this period of time “wrings” out remaining oxygen from the muscles so that fast-twitch muscle

fibers—important components of muscle strength output—are recruited. The person performs the reps at a very low load, i.e., 20-30% of optimal effort.

The limb occlusion pressure used varies between individuals and also between sides of the body. Cuff placement, cuff width, systolic blood pressure, limb circumference and density, race and gender all play a role in how many mm Hg it takes to achieve the target occlusive effect. This technique is well tolerated by the patient and incites minimal pain.

Even within two to three weeks, dramatic improvements in muscle force are realized. There are other benefits as well: Vascular occlusion results in lactate being trapped in the muscles, and this triggers the brain to release growth hormone that is 290% above baseline—that is not a typo! Such growth hormone increases enhance muscle strengthening. Another benefit from the trapping of lactate is increased release of B-endorphins, which is important because a painful muscle is not able to generate strength.

One Japanese study in 2006 demonstrated that cuff pressure of 200-230 mm Hg at a human walk pace for two weeks increased serum growth hormone by 40% and further increased skeletal muscle thickness.

Johnson reported on the use of the BFR technique in horses and found that there was no thrombosis and no laminitis when vascular flow was occluded in horse legs. Muscle margins rounded, blood vessels remained engorged for hours after a BFR session, and muscles improved in hyperechogenicity on ultrasound. BFR was found to improve bone healing in addition to muscle effects, and it also improved superficial digital flexor tendinopathy results when used for three weeks with no walking.

She described some of the pathophysiology of how BFR can work: Cell

swelling improves transport across cell membranes while also decreasing myostatin, which is an inhibitor of muscle growth. Other cellular mechanisms are at work in the presence of hypoxia.

Post-Operative Strategies

The in-depth rehabilitation session continued with presentations by Lauren Schnabel, DVM, PhD, DACVS, DACVSMR, of North Carolina State University, and Brian Noehren, PT, PhD, FACSM, of the University of Kentucky. Noehren cited a favorite quote from Abraham Lincoln: “Give me six hours to chop down a tree, and I will spend the first four sharpening an axe.” This sentiment is all important to prepare a patient for post-op rehabilitation by employing pre-rehabilitation techniques to optimize full range-of-motion (ROM) of the operated anatomical part.

He described a goal of achieving full (or as much as possible) ROM prior to surgery using warm up, mobilizations and arthrokinematics of a joint so it tracks properly. Protracted holds are used for extension and flexion. Stretching exercises induce plastic changes in the tissues. Also important in pre-rehab is to control swelling and effusion using ice and compression.

Gait training is another technique to obtain as normal a heel/toe pattern as possible. A patient might be assisted early on with support, which is then gradually pulled away. Neuromuscular control is stimulated using electrical stimulation devices and also perturbation training (improving stabilizing muscle contractions while negotiating uneven surfaces) and balance exercises. And, finally, Noehren spoke to the importance of psychosocial factors of depression, fear and uncertainty, as well as the effect of pain. He emphasized that not only does the patient need education on this point, but also the caregivers need knowledge to optimize a patient’s recovery.

Schnabel has spent considerable thought trying to apply pre-rehabilitation practices to the equine athlete in preparation for surgery. First steps involve setting up expectations and a template for success. The horse should be placed in an optimal environment that induces a calm state and a comfortable confinement area that might even include a porch turnout. The horse is acclimated to stall rest, bandages, equipment and exercises. An appropriate diet is fed, mental stimulation provided with toys, and compatible barn mates housed nearby. Confident handlers improve a horse’s confidence.

In some cases, a horse might need long-term sedation with trazadone, which is a serotonin antagonist and re-uptake inhibitor with no gastrointestinal side effects. Reserpine is not useful due to lowering blood pressure that makes general anesthesia challenging.

Part of the “pre-hab” program is to acustom the horse to hand- or tack-walking in the location where post-op rehab will be done, and to start exercises with the handler who will be managing the horse post-op. An appropriate handler and compliance with instructions are hugely instrumental in a horse’s recovery, said Schnabel. The horse should be accustomed to specific exercises, ROM procedures, bandaging, icing, compression and other equipment uses prior to surgery.

Strengthening is achieved through lateral neck exercises and dynamic mobilization exercises to activate and strengthen core muscles, especially the multifidus muscles of the back and other core muscle groups. Equiband resistance bands improve proprioception and engagement of the hindlimbs. Functional electrical stimulation (FES) has been found to be useful to improve multifidus symmetry and movement of the lumbo-sacral area.

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

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Dr. Katie Garrett reviewed a paper about survival and racing performance in Thoroughbred foals following a bout with septic arthritis.

stimulations around the coronary band and pastern stimulates higher pickup of the limb, as do ground pole work. Working a horse on varied surfaces also improves such control. Balance pads (Sure Foot Equine) improve a horse's postural stability and paraspinal muscle adaptation to amplify the effects of a rehabilitation program, much like perturbation training in humans.

Psychosocial influences are relevant for horses, as well, with control of pain helping to relieve negative associations by the horse when performing specific exercises. The use of the Pain Ethogram is helpful to identify level of pain a horse might be tolerating. Caretakers and riders also need education to manage their hesitations or fears that could have substantial negative effects on a horse.

Foot balancing and shoeing is critical, particularly when addressing flexor tendon injuries of the distal limb. Just as important is applying sound farrier techniques to rear limb issues.

Nutrition is adjusted to provide

nutrients that optimize healing without making a horse too "high" and active. Stall toys and slow feeder hay nets help to decrease boredom, and windows in the stall give a horse some mental stimulation. Handlers should lavish a horse undergoing rehab with attention, affection and grooming, and they should maintain a routine schedule, which is calming to a horse.

Virtual and Remote Care Via Telemedicine

Do you balk at the idea of conducting medical practice via a virtual platform? Turns out that many equine practitioners are already using telemedicine in the form of text, phone consults, emails and websites. Many veterinarians have a fear of liability using a remote mode of communication, and there is the problem of how to monetize your time.

A table topic session led by Eleanor Green, DVM, DACVIM, DABVP, of Texas A&M, and Richard Markell, DVM, MRCVS, MBA, CEO IlluminX

Consulting, engaged participants in a lively conversation about the value and logistics of implementing telemedicine in an equine practice. They emphasized at the start that telemedicine has a broad-reaching potential that facilitates practice efficiency and profitability.

Lessons from human healthcare during the time of COVID-19 are edifying. Equine veterinarians are advised to remember that our clients are patients themselves and have likely availed themselves of telemedicine options with their own physicians. By April 2020, 97% of MDs were using telemedicine. Horse-owning clients expect veterinary care that rivals what they receive from the human medical community. One benefit of human telemedicine is that 54% of rural communities are now reachable, and it is a great resource especially for older patients or Medicare recipients.

More than 75% of physicians said that telemedicine provides better care for patients and is equivalent to in-person



care. More than 80% of patients are satisfied with telemedicine—77% are completely satisfied, 85% find it easier to obtain needed care and 50% say they would switch medical providers in order to continue to obtain telemedicine. Younger generations are tech savvy, and this format has the potential to recruit new clients (and associate veterinarians) from a younger demographic that prefers digital communication over phone, paper or even in-person communication.

So, how can one monetize this process? Green and Markell made some cogent suggestions:

- Let clients know this is an added part of your practice, i.e., a new “arm” of patient care.
- Advise about this policy during wellness exams, on the practice website and through newsletters.
- “Gold” level clients might receive telemedicine at no charge, or any client could be refunded the cost of a telemedicine visit if that visit leads to in-person work.
- Set up a dedicated appointment time for a virtual visit—by booking an ap-

pointment, the interaction is perceived as a value.

- It might be possible to do a telemedicine phone visit while driving between ambulatory calls that can be transcribed later. In many states, it is necessary to inform and receive consent by a client if you are recording a call. Phone consults in the format of telemedicine are a way to recover income for all the previously uncharged phone consultations, especially those that are not always documented.
- Zoom-format meetings can be recorded and inserted into a patient’s medical record.

It was stressed that clients need instructions to get the most from telehealth. This includes emphasizing that not all issues are appropriate for telemedicine and might need in-person interaction as well as advice on what to expect from televisits. State the fee and recheck fee up front and provide detailed instructions on how to access the virtual visit. Green and Markell could not stress enough the importance of good communication.

Another essential component of making telemedicine work is the need for a veterinarian to document via written or templated forms that are then included in the patient’s medical record.

In addition to virtual visits with clients with medical questions, horse owners are likely more receptive to consult fees for a veterinarian’s evaluation of prepurchase exam videos, photos, reports and radiographs. Charges can be made for consultation on pre-purchase exam videos and imaging that help determine whether a client should go forward with evaluating a prospect. It is important to counsel clients that not all video and photographic materials are useful and there might be limitations as to information gleaned. Photographic material can be saved, but Markell makes an important point that radiographs should be transmitted as Dicom because

jpgs can be altered or doctored via Adobe Photoshop or Lightroom.

Telemedicine additionally has the potential to improve job satisfaction for licensed veterinary technicians who might be able to gather physical exam information such as taking vital signs or performing real-time ultrasound exams that are viewed by the vet in another location, or acquiring data from an Equinosis’ Lameness Locator about details of a lameness exam.

Unfortunately, many technicians leave a practice after five years with the complaint that they are not asked to operate at the level of their training. Greater job satisfaction translates to less turnover of staff, and more tasks assigned to a tech is a means to justify a better salary for that person. All of this increases job satisfaction. It is important to consult state board regulations to confirm how much a veterinary technician is allowed to do without direct supervision.

One other benefit of telemedicine is with the use of wearables such as digital monitors, blood pressure readings, pain tracing, vital signs acquisition, and in some cases, live video feeds.

The table topic hosts suggested that the best way of dealing with telemedicine is to treat each interaction as if it is an in-person interaction. For practitioners to offer veterinary counsel to horse owners, they must be licensed to practice in the state where the horse resides; otherwise, it is possible for a veterinarian to consult with a colleague who is licensed in that state rather than providing medical counsel directly to the inquiring horse owner.

Under no circumstance should a veterinarian-client-patient relationship (VCPR) be established through telemedicine. A website—www.vvca.org—provides resources to identify which states allow veterinary telemedicine and other important facts to enable legal use of telemedicine in the state(s) where you practice. **EM**



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Understanding what motivates each generation of veterinarians can help equine practices succeed.

Business Keys from the 2021 AAEP Convention

‘We are at a tipping point in the equine industry,’ said one speaker at the AAEP Convention, and this article discusses issues and solutions to make the industry thrive.

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By Amy L. Grice, VMD, MBA

The AAEP Annual Convention is the world’s largest continuing education event dedicated to equine practice, with more than 100 hours of continuing education. In 2021, 3,662 veterinary professionals, students, guests and exhibitors attended the 67th edition of the Convention, gathering in Nashville, Tennessee, for the in-person meeting. More than 500 additional

equine veterinarians registered for virtual-only access.

Keynote Speaker

Opening day of the convention featured keynote speaker Meagan Johnson, a nationally recognized multi-generational educator. She has worked with a variety of organizations and associations to build cultures of multi-generational inclusivity by exploring each generation’s

needs to succeed. Her presentation, sprinkled with humor, was entitled “Zap the Gap: Generational Differences Examined.”

Johnson opened by asking the audience to share discussion on the positives as well as the difficulties or frustrations with working with the older generation—then do the same for the younger generation. She then captured words and phrases from the crowd, supplementing



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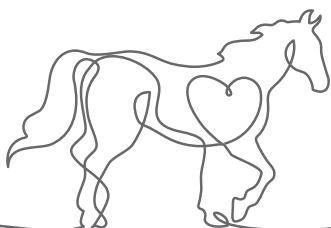
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Meagan Johnson was the keynote speaker at the 2021 AAEP Convention, talking about "Zap the Gap: Generational Differences Examined."

them with words from her slides.

Positive attributes with the older generation included experience, wisdom, hard-working, face-to-face conversation, knowledge, customers trust them, dependable, on time and good mentors. Frustrations included stubbornness, resistant to change, territorial, bad with technology, stereotype younger people, skeptical and slow.

The positive attributes expressed about the younger generation included energy, fresh ideas, teamwork, creativity, tech savvy, passionate, entrepreneurial, environmentally sensitive, excited, fun, challenge the status quo and embrace change. Negative attributes of the younger generation included laziness, don't want to pay their dues, poor face-to-face communication, lack of focus, bad attitude, entitled, disloyal, continually complaining, apathetic, wants reward with no effort and just wants to have fun.

Then the speaker surprised the audience by revealing that her slides on these attributes had been taken from *LIFE* Magazine in 1967!

Johnson went on to say that "We're all the same" because we use the same words to describe every generation when they are young. A youthful generation is a new generation, with its own

generational signposts, defined as events that are specific to that generation.

These signposts do differentiate between generations because clusters of people born during the same timeframe have been shaped by their similar experiences, she said.

She asked the question "What can we do to bring in the next generation?" against the backdrop of more equine veterinarians retiring each year than are joining the profession. She noted that encouraging their sense of belonging is vital.

Generations Defined

In describing the different generations, the speaker started with the 72 million Baby Boomers, those born between 1946 and 1964. As they retire, the number of seniors will double, she said. This was the first generation to have an expectation of higher education and to bring teamwork into the workplace because they were graded on their ability to work well with others. This generation challenged the rules and pushed against the establishment, seeking to create a better world. The Vietnam War was a signpost for this time, and it caused the birthrate to fall, she related.

Generation X (1965-1980) resulted during this time of the falling birth

rate, leading to a very small generation, the speaker continued. These were the Latchkey Kids, who came home to an empty house while both parents were working. The signpost for this generation was television, which became a significant feature of daily life. These children also often had a list of tasks left by the "management" (their parents), she related, but there was freedom to complete the tasks whenever they wanted, as long as they got done. This led to a generation of workers who are independent problem-solvers who want to be left alone to perform their work after being given the tools and expectations to succeed.

After 1980, the birthrate increased sharply, and the 80-million-strong Millennial generation (those born 1980-1996) emerged. Within 10 years they will represent 80% of the workforce. More than 90% of this generation are close to their parents and consider them friends. This is the generation that was raised by Soccer Moms and Stay-at-Home Dads, the speaker shared. One of their strong characteristics is the desire to work for organizations that care about society, the environment and working toward a greater good. Because they were raised by such involved parents, Millennials crave mentorship and regular feedback, as well as social connection, she continued. Questions to ask them are "What can you do better?" "What resources do you need?" "What do you want to learn?" Understanding the sense of purpose for the organization is important to their longevity at a company, so share your mission and vision.

Gen Z (born between 1997 and 2012) number 74 million and are expected to be 30% of the workforce by 2030, Johnson related. They are digitally native and spend an average of 23 hours per week watching video streams. They are quite ethnically diverse and are likely to choose the city where they want to

live, then find a job, rather than the opposite. Because social media is so pervasive in their lives, the social media presence of a business where they might consider working is important to them as a tool to judge the personality of the firm, she said.

In closing, Johnson challenged us to think about how we respond to younger generations that question our ways of doing things. Instead of saying “no,” she suggested questioning whether a change would negatively affect cost, quality, safety or service. Because passion comes from the use of one’s ideas and increases engagement and ownership, she encouraged veterinary practitioners to be open to the next generations.

Keeping Equine Practitioners in Equine Practice

A standing-room-only crowd attended a special Retention Session on Sunday afternoon. The afternoon commenced with an overview of the current state of equine practice, presented by this author, followed by an update by Dr. Rob Trimble on the progress of the AAEP Retention Task Force, led by Dr. Carol Clark. After a vigorous panel discussion and question-and-answer session with six former equine practitioners who left the equine space, three veterinarians gave presentations on ways they have experienced and achieved positive change within equine practice.

The Challenges of Equine Practice in 2021

Using survey statistics from various sources, this author showed how the pandemic had affected equine practices. A large majority of practices reported better financial performance in both 2020 and 2021, and only a very small percentage struggled financially.

Utilizing a survey conducted in November 2021 for EquiManagement (you can find articles related to that survey on pages 50 and 54, and the complete

EquiManagement.com



Dr. Rob Tremble updated the AAEP Attendees on the progress of the AAEP Retention Task Force, which is led by Dr. Carol Clark.

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article on EquiManagement.com by searching "State of Equine Veterinary Practice 2021 Survey"), the speaker outlined the ways that equine practices were busier in the last two years.

Respondents reported that their practices were busier in 2020 than 2019 in several ways: Almost 71% reported increased revenue, almost 60% worked more hours, 65% said they added more appointments, 63% increased their number of new clients and 44% saw more emergencies. This busy-ness continued when 2021 was compared to 2020, with almost 76% reporting increased revenue, almost 62% working more hours in 2021 than 2020, 69% saying they added more appointments, and 66% increasing their number of new clients. The survey showed that 46% saw even more emergencies.

Pivoting to the use of telemedicine during the response to COVID-19, this author shared survey results indicating that when asked “Does your practice do any telemedicine, including assessing patients by text, video, photographs, Zoom meetings, or other means?”, about 24% said they use these methods regularly, 30.6% said occasionally, 21.2% said rarely and 24.4% said they did no telemedicine. Shockingly, 78.9% reported that they do not charge for telemedicine,

8.1% charge a flat fee no matter how long the interaction takes, and 13.1% said they charge per an increment of time. There was a wide variation in how much telemedicine costs clients, from \$0 to more than \$50. Almost 10% of respondents reported that their average charge is more than \$50, the survey noted.

Next, this author shared various estimates of the U.S. horse population. The recent 2016 finding by the AVMA noted that pet horse numbers have decreased by 61% since 2011, with the 7.3 million pet horse population in 2006 falling to 1.9 million in 2016. The most recent American Horse Council study in 2017 estimated a total population of 7.2 million, she added.

Sharing results from the September 2021 American Horse Publications survey, this author had some uplifting news. The average respondent in this survey owned or managed about six horses, she said. 85.6% currently owned or managed the same number of horses or more as they did in 2020, and when asked about future expectations of ownership, 90.3% expected to own or manage the same number of horses or more in 2022 as in 2021.

This author went on to share the demographics of the equine veterinary

profession, with AAEP data indicating there were 7,463 veterinarian and 1,578 student AAEP members in 2019. Females are now the majority of members at 51.4%. Solo practitioners make up about 38% of members, she said, with only 47% of members exclusively equine. The 2016 AVMA AAEP Equine Economic Survey found that 38.5% of equine veterinarians were solo practitioners, with 52.8% of equine practices having two or fewer full-time equivalent (FTE) veterinarians. “We are an industry of mostly small practices,” the author said.

Continuing with AVMA data, she stated that four generations are represented among current U.S. veterinarians. In 2021, Millennials comprised 35.1% of the veterinary workforce, Generation X were 34.6%, Baby Boomers made up 29.9% and Traditionals consisted of a mere 0.4%. She explained that we can expect this generational shift to bring significant changes to the profession. “Each generation has its own cultural tendencies and characteristics, so we can anticipate that behaviors and attitudes of veterinarians will shift along with the age of the workforce,” she concluded.

After lamenting the decrease in new graduates entering equine practice, a number that has fallen from 5.7% in 2003 to 1.0% in 2019 before rising to 1.4% in 2020, the speaker reported on AVMA data that predicts 60 equine practitioner retirements per year, increasing by 3% per year.

She postulated that the low number of graduates entering the field was due in

part to the large amount of educational debt. According to the AVMA 2021 State of the Profession report, although 17% of those who graduated in 2020 had no debt, the average debt of those who had to borrow to finance their veterinary degree was \$188,853. The report noted that 34% of 2020 graduates had debt levels greater than \$200,000, and 12.5% had debt levels more than \$300,000. The report noted that 1.4% had a whopping \$400,000 or more in debt. She also reported that the debt-to-income ratio has been rising—debt has grown at 4.5 times the rate of salary



Business is good for equine vets, but starting salaries are low compared to those of small animal vets.

increases, noting that the 2020 average debt-to-income ratio was 2.6 for veterinarians, with 1.6 considered reasonable for professionals.

The author wrapped up her overview by sharing that unemployment in the veterinary field is less than 1%, and associates are hard to find across all types of practice. In order to keep a flow of graduates into equine private practice, she stated that the industry needs to address starting salaries. She explained that the AVMA Senior Survey is given each year to veterinary graduates, and in 2019, the 28 new doctors entering equine practice without an internship

were offered a mean salary of \$53,804 while companion animal positions had a mean salary of more than \$90,000. This survey also called out 135 graduates entering equine internship positions; their salaries were not included in the \$53,804 mean.

In the 2020 AVMA Senior Survey, starting salaries were divided by gender. The four males that entered equine practice received a mean starting salary of \$75,000, while the 26 females received a mean starting salary of \$56,000, she reported. Differences in salary between the genders were much less pronounced

in other sectors. This author said, “This is disappointing to see. Equine practice owners need to consider why this inequity persists in our industry. Attracting more veterinarians to equine practice is unlikely to occur under these conditions.”

Finally, the presenter shared a few results from her recent survey that asked respondents “Has your practice experienced difficul-

ty in hiring and/or retaining associate veterinarians in the last two years?” A third replied “Yes, a great deal,” about 24% said “Yes, some” and only 27.7% reported having no difficulty. “This is clearly a pain point in the profession,” she commented.

In summary, this author stated, “Equine practices are busy and demand for services is likely to continue to be strong. Equine practices are doing well financially despite the pandemic, but the lack of new graduates entering and remaining in equine practice may impact continued growth. Burnout indicators and stress are high among DVMs. New

ISTOCK

Balancing Passion and Practice

Veterinary industry professionals offer perspectives on best financial practices for a more fulfilling and successful work/life balance.

By Kimberly S. Brown

CareCredit—a financing solution for veterinary clients—brought together a diverse group of equine veterinary industry experts for a four-hour roundtable to talk about the current state of practice and vet life. Those participants included Amy Grice, VMD, MBA, Charlotte Hansen, MS, Wendy Krebs, DVM, Kyle Palmer, CVT, and Kelly Zeytoonian, DVM, MBA. These experts discussed the gold standard of client payment, financial preparedness of clients, how veterinary businesses are run compared to small animal, dealing with on-farm bill pay, handling non-pay clients, and the balance of economics and emotions.

The “Money” Talk

In the 2020 Equine Practice and Passion Survey by CareCredit, 90% of veterinarians surveyed said they don't like to talk about money with clients. Dr. Grice said, “Equine practitioners need to embrace the value that they provide and feel confident in charging appropriately for what they do ... Veterinarians really need to do a little soul searching and realize that most of them have a hard time talking about money, and it makes them feel kind of squeamish, like they don't deserve to receive payment for taking care of somebody's horse.”

Also, the 2021 AVMA Language of Veterinary Care Study

has shown that clients want to know medical costs up front.

“I need to respect the client enough to have the financial discussion up front with them,” said Dr. Krebs.

Hansen noted that “if clients can anticipate what they're going to need to budget for, that will be less stressful for them. And it will be less stressful for you and the veterinarian-client relationship.”

Dr. Grice concluded, “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. 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.”

Payment at Time of Service

All roundtable attendees said a basic requirement for solving some of the business and stress issues in equine veterinary medicine is that payment at time of service should be the “gold standard” in how clients pay equine veterinarians for services. But collecting that money in the field presents issues.

“Veterinarians in the field collect money easier if it's easy for them to do. They just have to understand how to do it,” said Palmer. “There's nothing better in terms of collecting the debt

than not incurring it in the first place.”

According to Dr. Grice's personal industry research, the stress of business and the comparisons to small animal work are causing a 50% loss of new equine veterinarians within the first five years of practice.

“It starts to feel for people like they're sacrificing their life on the altar of veterinary medicine,” Dr. Grice said. “And they see their friends or people outside of veterinary medicine having a normal life that doesn't look like that. And they feel trapped in this thing that they love, but that is eating them alive ... We have the capability to have a positive future. We just have to create new paradigms in equine practice.”

It comes down to clients paying and respecting their veterinarians as they would any other professional.

To put it simply, “It is not our job to subsidize someone's hobby,” said Dr. Zeytoonian.

Dr. Krebs expanded on that idea, saying, “I am there to help [clients] to the best of my capability and within their resources, but it does not fall on my shoulders to enable them financially. I absolutely acknowledge to them the stress of the situation that they're under. I acknowledge that it's expensive, and I'm empathetic. But I can help provide solutions that are within their means. And that does not mean that I

need to be the one that subsidizes their animals' health care.”

Relational vs Transactional

When discussing “relational” vs “transactional” client relationships, Palmer said, “I think it's not really a question of one or the other. It's a question of how you use one in proper compatibility with the other. They can complement each other if you do them right.”

Dr. Grice added that “with a strong relationship, the transactional part becomes much easier.”

Moving Forward

Dr. Zeytoonian noted, “A small change that I think could make a big impact on clinics would be utilizing paperless billing and just getting bills out faster.”

Palmer said online payments “have worked very well. It's a great tool and, by all rights, the next big evolution in payment processing.”

Take-Home Message

“I think that we are at the moment in this industry where things could go really bad, or we could make some good decisions as an industry to change our pay scale, our fee schedules, increase compensations—start making equine work a better prospect for people,” Palmer said. “Otherwise, I don't know what kind of conversation we're going to be having if we come back in five years and do this again.”

Read more about how these panelists live in the equine veterinary industry of today and their opinions on the future with two articles—one in the Winter issue of *EquiManagement* magazine and an extended article on <https://bit.ly/carecreditrroundtable>.

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The differences in starting salaries for veterinarians in equine and small animal practices point to issues in hiring in our industry.

approaches are needed to turn our profession around.”

Initial Findings of the AAEP Retention Task Force

Trimble reported on the findings from a series of 59 intensive interviews with stakeholders in the equine veterinary community—vet students, newer graduates and practice owners. He reported that during the qualitative, approximately 30-minute interviews, interviewees were asked two main questions in a variety of ways: “What do you LOVE about your work in the equine profession, and what keeps you here?” and “What you do HATE about your work, and what things push you out of the profession?” Trimble stated that the work identified several areas of opportunity where the AAEP can make tangible improvements to the lives of its members.

In determining the best approaches, Trimble suggested, “We need to prioritize the problems that are worth tackling first and form working groups.” By working with early adopters of new

strategies, he suggested the groups could learn and refine best practices, with the goal of developing more efficient and scalable solutions for the broader equine veterinary profession.

The 15 veterinary students interviewed came from a number of different schools, and they were equally divided between attending second, third and fourth years. The results of the interviews showed a number of issues that were pushing students away from equine practice, the speaker shared. These included feeling they had poor skills for communicating the value of services to clients and not being trained to understand pricing, the cost of services or the value they provide. In addition, ethical issues, not having access to family during stressful times, restrictive noncompete clauses, competition with classmates for internship placements and pressure to do an internship in order to get a job were frequently cited, Trimble said.

Importantly, there also were many who spoke of the heightened risk

of injury in equine practice and the culture of equine practice making the “non-horsey” people feel unwelcome. In addition, students spoke of their perception that equine veterinary medicine is not conducive to starting or maintaining a family, he added.

Quoting a student, Trimble shared, “I think, generally, we could be more collaborative as a field. We’re dying out is the bottom line, and there’s plenty of horses, so it’s a shame in my mind that we can’t work together to make things a little bit easier on all of us.”

Trimble then explained the things that students said had encouraged them toward equine practice. Those included flexible work schedules, adequate pay, adequate support staff, good practice cultures, and education on business, communication and maintaining their well-being. The interviewed students recognized how technical staff could increase efficiency and revenue.

As the speaker relayed, one interviewee said, “We were doing health certificates and Coggins and hock injections, and the tech was rolling through horses and doing all of that, and we were doing the more medically intense stuff. We finished 30 horses in one day, and that was a major payout for the doctor because we had well-trained technicians who are allowed to do their own stuff. Like in small animal, techs do everything, and in equine, they just like hold horses.”

The issues laid out by the speaker for equine-oriented veterinary students included:

- poor internship application experience
- worry about not being able to pay student loans upon graduation
- fear of losing their passion for the work
- lack of confidence with the practical skills being built in veterinary school
- uncertainty in how to identify, select and commit to a practice
- hearing discouragement from professors and other veterinarians about

- pursuing a career as an equine doctor
- the struggle to set appropriate boundaries in future practice

Next, the speaker moved to the results of the interviews with recent graduates and the aspects that pushed those veterinarians toward leaving equine practice. Those included noncompete agreements, ethical/moral issues, a lack of community or lack of access to family, the need for time off from work, pressure to *not* take time off or use a given benefit, low compensation, sexism, poor practice cultures, unrealistic client expectations and inadequate support staff.

New graduates had responses similar to veterinary students regarding many of the elements that pulled them to stay in equine practice, said Trimble. These elements were flexible work schedules, adequate pay, financial security, adequate support staff, time for friends and family, reasonable working hours, practices that support and back up the veterinarian (especially with clients) and a good workplace culture.

The speaker outlined the problems of new graduates, listing their struggle to set boundaries, the lack of adequate support staff, lack of confidence with practical skills as they start their careers, poor sense of community, overly demanding on-call schedules, struggle with successful client communication, unkept promises from employers, lack of mentorship from employers, “the Boys’ Club” and sexism, and poor access to startup capital for those wishing to start their own practices.

Practice owners from multiple states were also interviewed. According to the speaker, things that pushed practice owners out of the equine veterinary field included the tight labor market, which makes hiring difficult; unrealistic client expectations and bad behavior; cutthroat competition with colleagues; difficulty with lenders and the inherently inefficient business model in equine practice.

As one owner stated, “I carry \$200,000 through breeding season in accounts receivable ... because people will carry that out through breeding season and then pay me back in October, after they send their yearlings to the sales. That’s what we’ve allowed clients to do and allowed clients to expect, but you can’t run a profitable business that way—that’s horrible on your cash flow.”

Conversely, the factors that hold owners in equine practice are collaboration with other practices, high demand for services, education in practice management, communication and other business topics, said Trimble. One interviewee explained, “The one thing that has helped me the most as a business owner, having not ever planned to become a business owner and having had no education whatsoever, was that I was able to do a practice management course, and that has helped me a lot and has really helped my practice be a lot more successful.”

The list of problems of practice owners, Trimble said, included:

- the inefficient business model
- difficulty recruiting, hiring and retaining DVMs
- fear of raising prices
- uncertainty of how to set fees
- struggles with staff and client communication
- difficulty setting boundaries
- poor collections processes, resulting in high accounts receivable and poor cash flow
- difficulty paying attractive associate salaries
- difficulty managing schedules and establishing shared on-call
- competition from lay practitioners

Utilizing the “pain points” of each group, Trimble explained, the Retention Task Force arrived at a series of possible solutions based on the feedback they received from those interviewed. These “minimally viable solutions” were designed to provide a framework for a

solution set that is intentionally incomplete yet “good enough to get started,” he said. Ideally, these solutions will be refined through feedback from early adopter clinics, then later incorporated into a broader and more comprehensive set of solutions designed for the “early majority,” with the ultimate goal of increasing retention and recruitment of equine veterinarians.

The recommended first steps for the AAEP were laid out by the speaker:

First, develop the group of “Early Adopter” practices to test-drive some solutions so they can be refined by this network and redesigned with a focus on increased convenience and practicality.

Second, actively support the adoption of technology that improves efficiency and champion the full utilization of staff.

Third, advocate for diversity of all kinds, including diversity of thought, diversity of background, diversity of upbringing and diversity of “horsiness.”

Fourth, redesign the internship process, possibly through an AAEP Internship Portal.

Fifth, deliver business education and peer support to newer graduates through networking groups such as Decade One.

As we enter the new year, there is much anticipation of the coming changes to our profession and hope that the efforts of the AAEP Retention Task Force—and all who are helping to move the needle—will lead to a bright future for the equine veterinary industry.

Panel Discussion of Veterinarians NO LONGER in Equine Practice

Drs. Brittany Breidenbach, Mark Buchert, Tracy E. Norman, Jennifer Madera, Maggie Peitzmeier and Thaddeus Williams formed the panel. All are former equine practitioners, three with board specialty designations, who now work in companion animal medicine or industry.

To start the session, they all told their stories of success in—and departure from—equine practice, then relayed the important changes that they saw were necessary to attract and retain future equine doctors. Important themes emerged, including the difficult balance between family responsibilities and the workplace. Although companion animal practice offers much higher compensation for working fewer hours with no emergency duty and was the best choice for their families, all of the panelists expressed their love of equine medicine and their dream to return.

For the males on the panel, ethical considerations, noncompete difficulties and low compensation primarily drove their decisions.

In a supportive, caring environment, these practitioners transparently shared their experiences and answered the concerns voiced by the audience. A palpable optimism was felt by attendees and panelists alike as the conversation showed the ongoing dedication of equine veterinarians to find real solutions to keep this amazing profession alive.

Innovative Models of Equine Practice

Dr. Caitlin Daly spoke about “Finding Success and Satisfaction in Solo Practice.” Her presentation began with the statement: “People don’t leave bad jobs; they leave because of poor management and bad bosses who don’t appreciate their value.”

She explained that solo practitioners have the freedom to create a practice model that is unique to their skill sets, professional goals, lifestyle and values. She suggested that a new solo practitioner ask himself or herself “What do you want to be known for?” and imagine the practice they want to own five or 10 years from now.

By utilizing strong branding, she said, this dream can become a reality. “You don’t just work for the practice, you *are* the practice,” Daly said. “When you’re

the brand, it’s continuously reinforced through your daily client communications and practice of veterinary medicine.” This allows you to attract clients who want what you offer, making practice more satisfying to you and your value higher to your clients.

Additional advantages of solo practice, she continued, include a greater potential for higher income than working as an associate due to lower upfront and overhead costs of ambulatory practice and the profits from business ownership added to your earnings for your effort as a veterinarian. However, she cautioned, you must educate yourself in business management, develop good boundaries and maintain excellent communication with your clients.

Unfortunately, Dr. Amanda McCleery, who wrote the excellent presentation “Better Together: Utilizing an Emergency Cooperative to Prevent Burnout,” was unable to present in Nashville due to her young toddler’s sudden onset of high fever, a vivid representation of the challenges that working mothers face. Another member of the cooperative, Dr. Martha Mallicote, gave the presentation in her place.

The presentation began with stating the challenge of providing 24/7/365 emergency care for solo practitioners. She presented a model of emergency cooperatives as a solution to help those in the equine practice career path. It reviewed the reasons that practitioners hesitate to form one, including loss of control over patient care, not meeting client expectations, losing clients, perhaps having the need to see other large animal species, having an increased geographic area to cover and loss of emergency revenue.

How McCleery’s practice met each of these challenges was then explained. The most important tenets of success were communicating well with clients and never surprising them, building trust and community with the cooperative’s

doctors, and understanding the value of having personal time. As McCleery wrote, “If you can figure it out, it can go a long way in making this rewarding career be more sustainable.”

Dr. Kelly Zeytoonian, owner of a multi-doctor, two-location equine practice in California, presented the topic “Alternative Schedules and Practice Roles: Rethinking Industry Norms Can Promote More Valuable and Sustainable Businesses.”

After reviewing both employee and employer “pain points” in equine practice, she recommended the following solutions:

- Charge appropriately.
- Hire part-time associates.
- Plan emergency coverage.
- Employ relief veterinarians.
- Leverage technicians.
- Develop a succession plan early in your career.

“Just like the practice of medicine itself, the beautiful thing about the business side of the veterinary profession is that there are a myriad of pathways and approaches to utilize,” she added.

“Once you’ve established or re-established your basic fees, it is important to continue increasing your prices,” the speaker said.

Without proper service charges, practice owners will not have the funds to implement the suggested solutions proposed. Associate veterinarians will have minimal incentive to work harder when they are not adequately compensated for their time. Practice owners should commit to reviewing their finances compared to industry benchmarks, because a focus on increased profitability will make the recommended management suggestions more obtainable.

Zeytoonian concluded, “We are at a tipping point in the equine industry. For all the trials and tribulations brought on by COVID, we have also been left with a healthy equine market and an opportunity to reshape the business model.” 



The speaker asked the audience, "What is your story of opportunity?"

Generationally Speaking

AAEP Convention speaker Jay McChord helps you learn about what is important to each generation and how to effectively engage them.

By Amy L. Grice, VMD, MBA

The Wellness session at the 2021 AAEP Convention featured a presentation by Jay McChord on "Relevant Leadership: Leading & Communicating Effectively in a Multi-Generational Workplace." McChord, a former Global Senior Sales Trainer for a multi-billion-dollar international technology company, was previously an elected official and is a published author and military artist. He now teaches communication, leadership and relationship skills through his company McChord Inc.

McChord's high-energy presentation began with an exhortation to "never look

down on a day of small beginnings." He said effective communicators can do great things from small beginnings. In our daily busy lives, veterinarians rarely have time to get off the treadmill to stop and think about their lives because they are "doing, doing, doing" all the time, he added. There is limited brain space for contemplation in these times, and most people are skeptical and don't know who to trust, according to McChord. He suggested that a goal for leaders is to become "people who know the times and know what to do." In other words, to be people with solutions to others' problems.

One of the biggest human fears is to be

irrelevant or have no value, the speaker said. In fact, everyone judges the relevance of those around them continually. Being relevant means being someone others can trust because you can resolve their concerns.

Next, McChord defined "The Times" as a global effect of COVID-19 that overlies everything else. He explained that everyone around the world is experiencing the pandemic differently—in his words, "same storm, different boats."

"Some people are in a rubber raft, and others are in a yacht," he said.

With the theme of "The Times" in mind, the speaker asked the audience to contemplate rubber bands and plastic by



Open communication between veterinarians and clients and among different generations of veterinarians is key to a successful future in the equine veterinary industry.

thinking about rubber bands as those things that will snap back to normal, and plastic as those things that will be changed forever. Then he posed the question “What are the opportunities that are presented?” By turning challenges into opportunities, some businesses will thrive, he said.

McChord related a story of a bourbon distillery in Kentucky that was in financial trouble as the pandemic descended, with bankruptcy looming. With the shortage of hand sanitizer that then emerged, the company pivoted from making bourbon to making hand sanitizer—and in the process made millions of dollars, saving the business. He asked the audience to consider: “What is your story of opportunity? What change can you make because now it’s acceptable?”

The audience responded with examples of things that would snap back to normal (i.e., “rubber bands”), including hosting student externships, renewed horse show activity and return to travel. The associated opportunities included

building relationships with possible future associates, increasing revenue with competition horses needing more care, and returning to providing prepurchase exams in far-flung locations.

Examples of “plastic,” or things that will be changed forever, included telemedicine, payment at the time of service and the equine practice version of “curbside service.” The opportunities attendees saw with these changes included new revenue streams, better cash flow, time efficiencies and lower stress levels.

The speaker reminded attendees that “There are opportunities everywhere!”

Attention Span

Returning to “The Times,” McChord relayed, to audience laughter, that the attention span of humans is currently 8 seconds, compared to a goldfish at 9 seconds. In the last 20 years, humans’ attention span has fallen 4 seconds. Because of this very short span of attention, the speaker emphasized that a person has only 8 seconds to communicate value,

whether it is the value of a procedure in saving a horse’s life or your understanding of your audience.

He asked, “In the last 12 months, how much time did you spend thinking about your audience, what is important to them and what they value?”

The advice he gave was to “obsess on your audience and give them what they care about within 8 seconds.”

Being concise is very important in every communication, whether spoken or in email, he said. Nothing unnecessary should be included because “you only have 8 seconds to get into their space.”

Generationally Speaking

Generations see the exact same thing differently, and they define the same words differently, the speaker emphasized. He used an example of the different actors that different generations think of as *the* James Bond.

With 80% of new graduates being Millennial females and 80% of practice owners being white male Baby Boomers,



Andy Roberts, DVM
Lexington, KY

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(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 5-(3,4,5-trimethoxyphenyl)methyl-2,4-pyrimidinodine. Trimethoprim is the non-proprietary name for 2,6-dimethyl-4-pyrimidinodine.

Figure 1. Structure of sulfadiazine

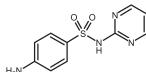
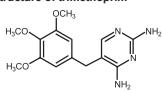


Figure 2. Structure of trimethoprim



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 foetal 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/reportnalme.

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, with trimethoprim filtration and tubular secretion. Urine concentrations of both sulfadiazine and trimethoprim are several-fold higher than blood concentrations.¹ Sulfadiazine and trimethoprim are 20% and 35% bound to plasma protein, respectively. Administration of sulfadiazine and trimethoprim with food has no apparent effect on the absorption of sulfadiazine but the absorption of trimethoprim is decreased.

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

Table 2. Median (Range) of sulfadiazine and trimethoprim pharmacokinetic 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) (µg·hr/mL)	159.35 (73.90–282.54)	5.47 (3.31–10.91)
T1/2 (hr)	7.80 (6.78–10.39)	3.00 (2.31–4.96)

MICROBIOLOGY

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

EQUISUL-SDT administered as a combined sulfadiazine-trimethoprim dose of 24 mg/kg body weight twice daily for 7 days provided concentrations of sulfadiazine and trimethoprim with T-MIC50 (%T) values of 100% and 98% respectively. The minimum

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

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

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

^a The correlation between *in vitro* susceptibility data and clinical effectiveness is unknown.

^b The lowest MIC to encompass 50% and 90% of the most susceptible isolates, respectively.

^c One isolate of *S. equi* subsp. *zooepidemicus* was not tested.

EFFECTIVENESS

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

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

Table 4. Overall Clinical Effectiveness Results

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

* P-value and estimated success rates are based on untransformed mean estimates from the statistical analysis.

ANIMAL SAFETY

In a target animal safety study, EQUISUL-SDT was administered orally to 32 healthy adult horses at 0 (0X), 24 (1X), 72 (3X), or 120 (5X) mg/kg twice daily for 30 days. Loose stool was the most common abnormal observation. Observations of loose stool (pellets with liquid or unforned/cowpie 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 on blood concentrations obtained during the study, it was noted that the sulfadiazine and trimethoprim plasma concentrations did not increase in proportion to dose. For sulfadiazine, a 3X and 5X dose resulted in an average exposure of 2.0X and 2.6X the concentrations observed following a 1X dose. For trimethoprim, the corresponding values were 2.5X and 3.5X as compared to the 1X dose. Furthermore, marked intersubject variability, particularly with sulfadiazine, resulted in substantial overlap of individual subject blood levels across the three dosing groups.

STORAGE CONDITIONS

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

HOW SUPPLIED

EQUISUL-SDT is available in the following package sizes:

- 135 mL
- 280 mL
- 560 mL
- 900 mL

[footnote]

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



01/2021



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Veterinarians need to understand the challenges and opportunities of the "Two 10s" in our world today.

communication conflict is inevitable.

The words "hard work," he said, "are tearing your profession apart."

McChord explained that to older generations of equine veterinarians, hard work means "25 hours a day, 8 days a week." This definition is completely different between generations. "It's the headwater," he said.

Other words that have very different meanings between generations include "simple technology," "time management," "success," "leadership" and "mental health."

The speaker then raised the idea of the "Compression of the Two 10s." McChord said that these two "10s" get closer every day, increasing pressure. The "two 10s" to which he referred are the 10,000 Baby Boomers retiring each day for the next 17 years and the 10,000 Millennials ascending to positions of decision making and authority. The pressure occurs be-

cause of loss of influence, institutional knowledge, mentoring and networks as Boomers retire.

“Perhaps it is one of your clients that provides 20-50% of your business revenue who is retiring,” said McChord, “or one of your top veterinarians.”

With a photograph of Disney World and of the Miami airport, he visually showed the traffic jam of old people in carts versus children in strollers and noted, “Skycaps are pushing two wheelchairs at a time!” The aging of these two huge generations is requiring changes on many levels. The speaker challenged the attendees to ask themselves:

- What are the challenges and opportunities of the Two 10s?
- Are you ready for the Compression of the Two 10s?

Thinking of it that way allows strategic rather than tactical thinking, he added.

Millennials are the largest generation in the world and in the workplace now, comprising nearly 70% of the workforce. In the next 10 years that generation will become the predominant decision-makers. They often question “Why are we doing it this way?” They are the generation of deconstruction, according to the speaker. When they want change or come to a leader asking “Why can’t we ...?”, McChord suggested replying “How would you see us doing it?” or “Bring me a solution” instead of saying “Because we’ve always done it that way.”

Why Do You ... ?

McChord then pivoted to the importance of understanding why a person does what he or she does. He asked the audience to think about completing the sentence “I come to work every day because ...” or “My practice exists because ...”

By aligning around the “why,” you attract people who share your “why,” he

continued—and this allows you to be more successful.

To understand the five current generations that share the workplace, McChord used a word and a picture for each.

First, he described the Traditionals, those born before 1946 and who currently are 75 years old or older. Members of this generation, he explained, want structure and believe in following rules. They are accustomed to organizational mandates that shape behavior and were formed by their experiences of World War II. Their word is “rules,” and their picture is an image of an hourglass alongside an Apple Watch. This group is vulnerable because time is moving fast and their hourglass is nearly empty. With these people, it is



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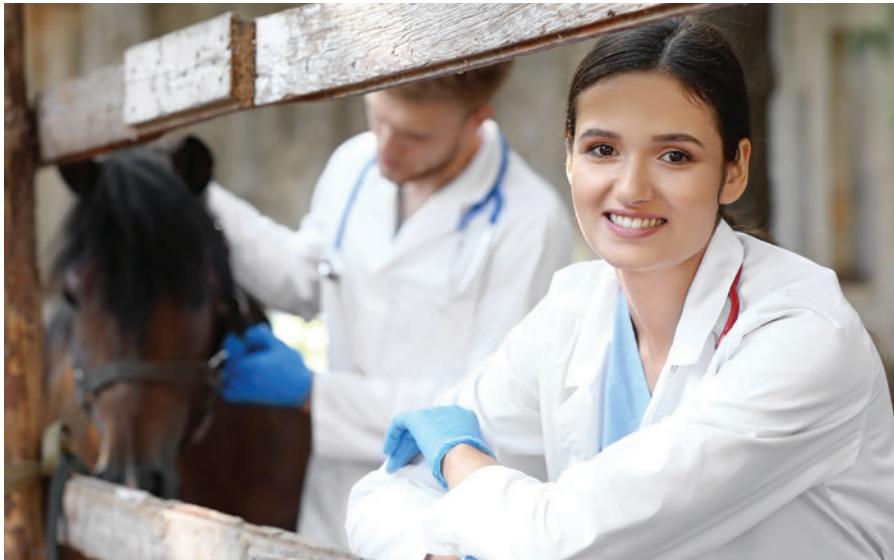
Respiratory: S. equi, EHV 1, EHV 4, Influenza, R. equi

Neurologic: EPM, EHV 1, WNV

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Businesses need to know what motivates veterinarians and other employees of the various generations and be willing to communicate in ways that resonate with each segment of the industry.

very important to slow down for them, rather than trying to get them to speed up. Show them respect by listening to their knowledge. “Make an effort now to spend time with your elders,” McChord exhorted, “for they have so much to offer.”

McChord said Baby Boomers are currently about 55-74 years of age and are thinking “Is this it? Is this all there is?” They are concerned about their legacy and how their decades of work will be remembered. “Did my work matter?” Their word is “legacy” and their image is a cornerstone of a building. When communicating with this generation, you need to show that you understand their priority and can improve their legacy.

The smallest generation in the workplace is Gen X, with members aged 44-54 years. This is the “forgotten generation” McChord said, though they are currently firmly entrenched in leadership and often are the primary decision makers. When they were growing up, they played the first video games—Pac-Man, for example—and were focused on rising through the levels until their initials were those with the highest scores. “They competed against a game,

not a person,” he emphasized.

Their word is “level,” and their image is a video game console. To connect with this generation, ask them “What are your two top priorities?” Then tell them how they can rise to the next level through the services you offer that allow them to pursue their highest priorities. Because the game of life will change, you must keep asking what the game is, the speaker emphasized.

Millennials are those currently of ages 21-39 years. “They want impact, and they want it now,” said McChord. Because one can speed up almost everything with technology, they get impatient and frustrated when technology cannot speed up relationships and the acquisition of skills. Those take time, he explained.

Their word is “impact” because they want to change the world. To engage them, explain how your practice will help them make a difference in the world. They want to control the story of their lives and make that story meaningful, he added.

The newest generation, Gen Z, are ages 6-21 years right now. They love individualized offerings, so their word

is “customize.” Their image is a customized school team letter jacket.

Companies are turning toward increased customization to please this cohort, the speaker reported, and allowing people to create exactly what they want. These young people want to create their own path, and they resonate with words like “becoming,” “belonging,” “journey” and “your story.” As they become part of the workforce, businesses will need to offer increasing flexibility, he said.

With communication to all generations, McChord summarized, you need to use the words that will pull in your audience.

The opposite of each generation’s word causes pain or discomfort, so you must read the environment.

“Remember, you only have 8 seconds to reach them,” he said.

With everyone in the same storm but situated in different boats, people have different concerns. But those who understand “what to do” will be the trusted leaders, he concluded.

Panel Discussion

Following this presentation, there was a panel discussion including the oldest four generations.

Panelist Dr. Stacey Cordivano commented, “As a Millennial, I personally resonate with the ‘impact’ word quite a bit. It was nice to hear some of the quirks of the Millennials explained in a positive way. I am hopeful that if this information can spread throughout our community, it will bridge some of the major gaps we are seeing between owners and associates.”

Traditionalist Dr. Reynolds Cowles added, “It was a robust discussion, and I believe everyone came away feeling that the generational key words were very useful and that the approach to most generational differences starts with good, open communication between the parties. The passion for the profession was palpable among all.” **EM**

COMPLETE JOINT

"I'm a bit of a skeptic when it comes to supplements. I've tried many over the years with no noticeable results until I tried Equithrive Joint. Not only did I see changes in the horses on the supplements, but when I accidentally ran out, I noticed a dramatic decline. That's proof enough for me that it is working!"

- Stacy Westfall

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This article doesn't suggest that horses should not be offered antioxidants, but encourages thought behind the process.

Radical Thought: Reactive Oxygen Species Are Good for Horses

Reactive oxygen species might not be the monstrous molecules they've been made out to be in veterinary medicine.

By Stacey Oke, DVM, MSc

Back in the 1950s, Denham Harman presented his thoughts on the free radical theory of ageing. In a nutshell, this theory posits that ageing occurs because free radicals damage cellular membranes, DNA, RNA and proteins, which results in the death of the cell and ergo the individual due to oxidative damage. To this day, free radicals such as reactive oxygen species (ROS) are widely construed—and

anthropomorphized—as malicious molecules with a vendetta, hell-bent on destroying everything in their paths.

Since Harman mounted his soapbox all those years ago, documents supporting the atrocities of free radicals snowballed, overshadowing the fact that free radicals—ROS in particular—aren't all bad. In fact, Ron Mittler, PhD, a professor in the Department of Agriculture, Food & Natural Resources and research professor in at the University of Missouri

School of Medicine, asserts that ROS are actually good.

“Maintaining a basal level of ROS in cells is essential for life as they are necessary for basic biological processes,” Mittler explained.

Given this alternate and scientifically sound theory on free radicals and ROS, which we will explore in more detail here, one might then ask: Is the equine industry going overboard with the antioxidant supplements?

EVERY DAY COUNTS.

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MAINTAINING A HEALTHY HORSE AND
CONTROLLING THE SIGNS OF PPID.



CONTROLLED SIGNS:

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3 months and continued
through 6 months.¹



PROVEN SUCCESS:

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were considered treatment
successes.¹



CLEAR IMPROVEMENT:

Hypertrichosis (delayed shedding)
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within 6 months.¹

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

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

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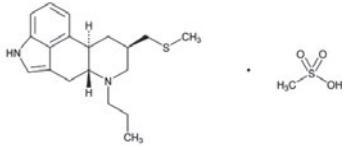
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1 mg

Dopamine receptor agonist for oral use in horses only

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

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



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

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

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

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

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

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

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

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

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

Warnings: Do not use in horses intended for human consumption. Keep PRASCEND in a secure location out of reach of dogs, cats, and other animals to prevent accidental ingestion or overdose.

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

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

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

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

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

Adverse Reactions:

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

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

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

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

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

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

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

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

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

Post-Approval Experience (2019):

The following adverse events are based on post approval adverse drug experience reporting for PRASCEND. Not all adverse events are reported. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data.

The following adverse events in horses are categorized in order of decreasing reporting frequency by body system and in decreasing order of reporting frequency within each body system:

General: anorexia, lethargy, weight loss

Gastrointestinal: diarrhea, abdominal pain/colic

Dermatological: alopecia, hyperhidrosis, dermatitis

Musculoskeletal: laminitis, muscle stiffness/soreness

Neurological: ataxia, seizure, muscle tremors

Behavioral: aggression (to other horses and humans), hyperactivity (anxiety, agitation), other behavioral changes (stud-like behavior, spooky, unpredictable, confused)

Clinical pathology: anemia, elevated liver enzymes, thrombocytopenia

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

Death (including euthanasia) has been reported.

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

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

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

Pharmacokinetic information in the horse is based on a study using single oral doses of 10 mcg/kg in six healthy mares between 3 and 17 years of age.² Pergolide was rapidly absorbed; the mean maximum concentration (C_{max}) was 4.05±2.02 ng/mL with the median time to maximum concentration (T_{max}) being 0.415 hours. The area under the curve (AUC) was 14.08±7.46 hr-ng/mL. The mean half life (T_{1/2}) was 5.86±3.42 hours; the mean apparent

oral clearance (CL/F) was 1204 mL/kg/hr; and the mean apparent volume of distribution (V/F) was 3082±1354 mL/kg.

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

Percent success	lower bound: one-sided 95% confidence interval
	68.6%

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

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

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

** Dexamethasone suppression test: Post dexamethasone cortisol concentration

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

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

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

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

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

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

Approved by FDA under NADA # 141-331

References:

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

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

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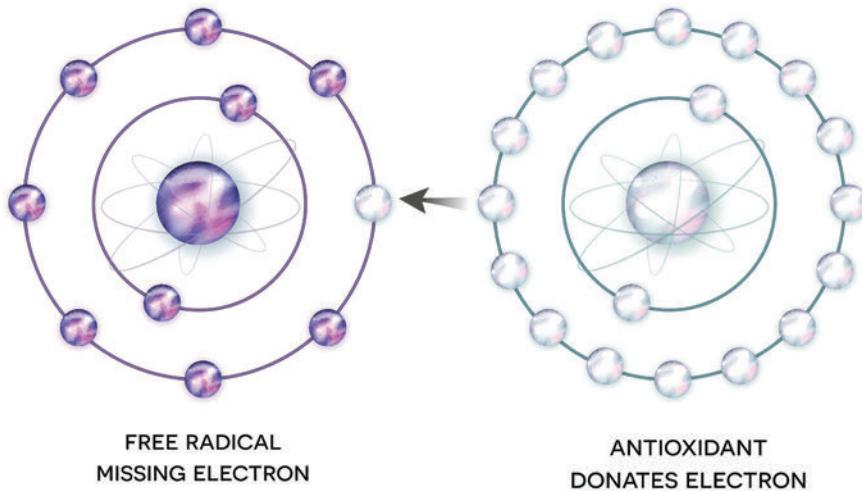
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US-EQU-0056-2021

HOW ANTIOXIDANTS WORK AGAINST FREE RADICALS



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A simplified view of how antioxidants can "treat" free radicals to supposedly reduce oxidative stress.

ROS Overview

Of all the free radicals and reactive molecules produced during normal metabolic processes, reactive oxygen species (ROS) are frequently fingered as the vilest. ROS are derived from molecular oxygen either through redox (reduction-oxidation) reactions or electronic excitation. Examples include hydrogen peroxide (H₂O₂), singlet molecular oxygen (1O₂), ozone (O₃), superoxide anion radical (O₂⁻) and hydroxyl radical (.OH).

ROS are generated during aerobic metabolism, such as the mitochondrial electron transport chain, which is the third phase of cellular respiration. Hydrogen peroxide, for example, is produced from molecular oxygen (O₂) by NADPH oxidases and superoxide dismutases, as well as a long list of other cellular enzymes. In fact, Sies and Jones report that in humans, more than 40 enzymes capable of generating H₂O₂ and O₂⁻ have been identified so far (*Nat Rev*

Mol Cell Biol. 2020;21(7):363-383).

"As ROS are produced, enzymes and antioxidants remove them, ensuring that the ROS are maintained at a basal, nontoxic level in the cell. A fine balance exists between ROS production and ROS removal, requiring a fully functional ROS network," described Mittler.

This ROS network includes all the enzymes and genes involved in ROS production, scavenging and transport in a cell. Mittler added, "In each different cell type, different parts of this network function. The overall outcome of the ROS network is that ROS are kept at a physiological, non-toxic level."

The maintenance level of ROS is referred to as "oxidative eustress." It is at these low cellular concentrations that ROS exert their beneficial effects.

Positive Actions of ROS

"ROS act as signaling molecules, regulating and maintaining normal physiological functions," said Mittler.

A good example of how ROS are effective signaling molecules, said Mittler, is the interaction of H₂O₂ with cysteine residues of proteins. Peroxide can oxidize those cysteine residues, which in turn results in structural and therefore also functional changes in the protein.

"The function of many of these ROS-regulated proteins is essential for the control of cellular proliferation, development, growth and defense against pathogens," explained Mittler.

Stem cells and immune cells are a good examples of cells that require ROS to conduct their function. However, according to Mittler, all cells need a basal level of ROS to regulate gene expression and maintain their functions.

"An increase in ROS production is required for the release of the proinflammatory cytokines interleukin-1b, tumor necrosis factor-a, and interferon-b that in turn are required for orchestrating an appropriate immune response," said Mittler. "Low ROS levels therefore prevent immune-response activation and lead to immunosuppression."

Mittler noted that gene regulation, cell-to-cell communication, hormonal regulation and other processes are either also linked to ROS levels or use ROS as messengers. But of course, the levels of ROS that a horse needs for optimal immunity, cell signaling, etc. have yet to be determined.

Exercise-Produced ROS Are Also Good

Strenuous, exhaustive or unaccustomed exercise in horses can induce oxidative stress. This is likely why antioxidant supplements are popular options for horses involved in competition. This is particularly true for endurance horses, show jumpers, dressage horses, Thoroughbred racehorses and Standardbred trotters, suggested a research team led by Peter Kruljc, dr.vet.med, Clinic for Reproduction and Large Animals, University of Ljubljana, Slovenia.

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In addition to the important roles ROS play in normal cellular functions, Kruljc and colleagues relayed in their study that ROS are considered necessary for adaptation to exercise training. This reportedly occurs by modulating muscle contraction and activating the endogenous antioxidant system, including an increased expression of antioxidant enzymes.

In their 2021 article published in *Antioxidants*, the researchers relayed that the antioxidant defense systems—including enzymatic and non-enzymatic antioxidants—are capable of major adaptations during acute and chronic exercise. Moderate exercise could be considered an antioxidant because low to moderate concentrations of ROS act as signals that induce the expression of powerful endogenous antioxidant enzymes.

Measuring Oxidative Stress in Horses

“Lipid peroxidation is the most common consequence of exercise-induced oxidative stress and can lead to the release of muscle enzymes into the systemic circulation,” said Kruljc.

Measuring markers of lipid peroxidation (such as malondialdehyde concentration) as well as the activities of antioxidant enzymes in blood samples could give a reasonable idea of how much oxidative stress is occurring in a horse at a specific time. Increased lipid peroxidation might be associated with the leakage of muscle enzymes into the circulation. Measuring muscle enzymes (creatinine kinase and aspartate aminotransferase) can easily be accomplished in any setting, but otherwise measuring oxidative stress is limited to research settings.

According to Alenka Nemeč Svete, a co-author on the study, it should be noted that “measuring creatine kinase and aspartate aminotransferase on their own is not a good indicator of

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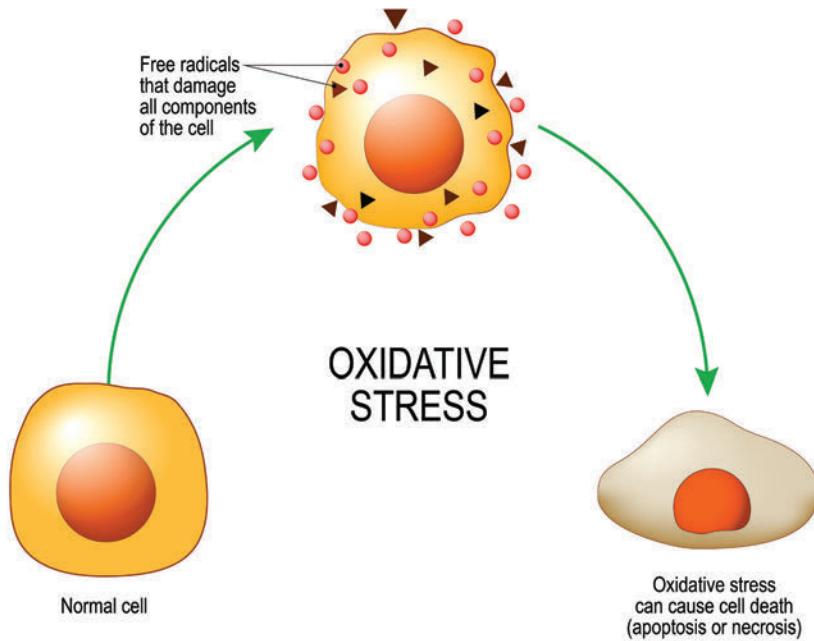
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Measuring oxidative stress in horses is not easily done outside of a research setting.

oxidative stress. These two enzymes may be increased after exercise due to higher permeability of muscle cells. On the other hand, the activity of these two enzymes might be elevated due to high extent of lipid peroxidation—a consequence of increased oxidative stress—that affects muscle cell membrane permeability.”

In the study by Kruljc *et al.*, various oxidative stress parameters were measured in untrained Standardbred horses subject to acute moderate exercise:

- Total antioxidant capacity (TAC) of serum or plasma to measure the uptake and/or production of antioxidants and their consumption during normal or increased oxidative stress
- SOD and GPX, endogenous enzymatic antioxidants
- Malondialdehyde levels, a marker of lipid peroxidation

“Malondialdehyde is a reliable and commonly used marker for lipid peroxidation and oxidative stress in a research setting,” said Kruljc.

Unfortunately, those tests are not currently available through veterinary

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diagnostic laboratories for everyday use in horses. This void in methods for assaying lipid peroxidation and oxidative stress in general therefore leaves horse owners and veterinarians unsure as to which horses require antioxidant supplementation. In many cases, horses end up being offered antioxidant supplements in a “better safe than sorry” manner, despite the fact that ROS are beneficial.

Antioxidant Supplement Research

Kruljc and colleagues noted that vitamin E is one of the most-studied and widely used antioxidant supplements in horses. Some studies suggest that vitamin E, a potent free radical scavenger, can reduce the concentration of lipid peroxidation products, thereby protecting horses from oxidative stress. “However, there are inconsistent results regarding the effects of vitamin E supplementation on exercise-induced oxidative stress,” said Kruljc.

Those inconsistencies could be related to the amount, duration, form and frequency of vitamin E supplementation, the type and timing of exercise used in the studies assessing exercise-induced oxidative stress, and the vitamin E status of the subjects prior to the studies, as well as the methods used to assess oxidative damage.

“Even in human athletes there is limited evidence to support the use of vitamin E as an antioxidant,” said Kruljc.

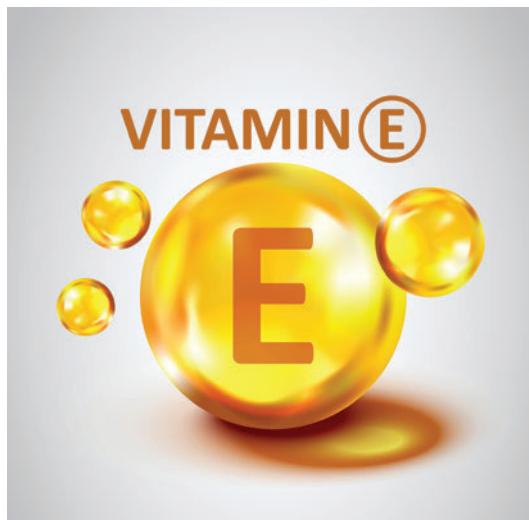
Similar conflicting results have been obtained for other antioxidant supplements (e.g., coenzyme Q10), and many supplements contain antioxidants or ingredients that purportedly have antioxidant properties that have not been studied in horses.

“I am a firm believer [in] supplementing vitamin E for horses without access to pasture that are exercising heavily. I

have seen the conflicting research but still think there is enough benefit to not worry about any detriment. As for other antioxidants, I have not seen any concrete evidence of benefit,” said Carey Williams, PhD, an equine extension specialist and professor from Rutgers.

Antioxidants and Vitamin E in Horses

“As we can see, *some* ROS are good but *too many* are not. So where is that line drawn and how do we figure that out in the real world?” Williams asked. While Kruljc and colleagues used a multitude of assays to evaluate oxidation in the



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Even supplemented or pastured horses can have low vitamin E levels.

horses in their study, those tests are largely restricted to a research setting.

“Clinically, there aren’t many options to measure ROS in horses,” said Carrie Finno, DVM, PhD, DACVIM, the Gregory L. Ferraro Endowed Director of the Center for Equine Health at the University of California, Davis. “However, we can measure serum vitamin E and target healthy levels of vitamin E and a balance of ROS, which has been shown to be important across species.”

Several veterinary diagnostic laboratories offer vitamin E testing for

horses. This could be a valuable tool considering a recently published study found that despite some pasture access or being offered some form of vitamin E supplementation, over one-third of horses had suboptimal plasma vitamin E levels (Pitel et al. 2020). In general, horses with low vitamin E levels had <6 hours/day pasture access and received <500 IU of supplemental vitamin E/day. The authors stated, “Furthermore, >20% of horses with apparently adequate vitamin E supplementation and pasture access were found to have deficient or marginal plasma alpha-tocopherol concentrations.”

Possible factors contributing to suboptimal vitamin E levels in supplemented horses and those with pasture access could be due to the amount, source or quality of vitamin E, or even failure to ingest the product. These results suggest that intermittent evaluation of plasma vitamin E levels might be valuable for heavily exercising horses to ensure their vitamin E status is optimal.

Testing for ROS in horses might be available sooner than later. Rossi et al. (2021) described a commercially available test for measuring antioxidant stress in horses. This test was evaluated in five Standardbred trotter horses at various times of training and racing. The research showed: “The KRL test may represent a valid method to determine oxidative stress in athletic horses.”

Final Thoughts

No one is suggesting that horses *shouldn't* be offered antioxidants. Instead, this article simply highlights the beneficial features of ROS and opens the door for us to ask: What we are hoping to gain from supplementing with antioxidants? This can be a challenging question since we can't easily determine which horses are suffering oxidative stress. **EM**



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NOW HIRING

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State of Equine Practice 2021 Survey: Practice Performance

A late 2021 survey of equine veterinarians helps us understand veterinary practice performance and issues of hiring in our industry.

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By Amy L. Grice, VMD, MBA

Are you having problems hiring lay staff or associates? You aren't alone! A survey conducted in late 2021 showed that the vast majority of veterinarians and practices looking to hire were having difficulties succeeding. One respondent commented, "I am currently trying to hire both

technicians and office support staff and having difficulty filling both positions."

To hypothesize why attraction and retention of non-veterinarian workers has been difficult, one can first look at the changes wrought by the COVID-19 pandemic. Not only have parents struggled with supervising children in remote schooling, as schools opened back up,

an exposure could send kids home for weeks of quarantine. The uncertainty of this reality made many mothers unwilling to commit to work obligations.

In addition, the ability to work remotely that became prevalent during the lockdowns of 2020 was very popular with many workers who enjoyed not having to commute to an office. The

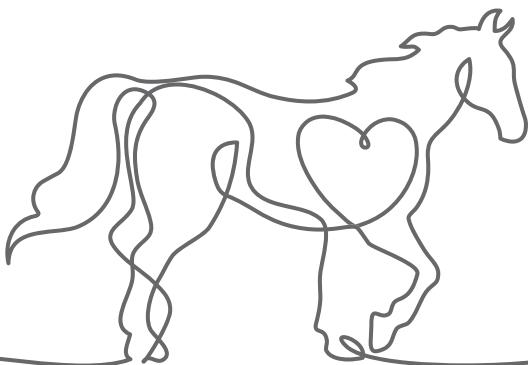


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The 2021 survey reported that many equine practices were doing well financially, some dramatically so.

time and money saved by no longer driving to work were often significant. Also, many people across the U.S. who experienced the pain of losing family or friends to the virus had a new appreciation for the fleeting nature of life. Even without this type of grief, many workers re-examined what was important to them and how they were willing to participate in the workforce. The Great Resignation was perhaps an overdue reckoning between work and life.

With available jobs greatly exceeding the number of applicants across the country, vet practices were not immune to the struggle. As pandemic relief funds bolstered the finances of workers, many were choosy in deciding where and for what wage they were willing to work. The pandemic also unleashed a historic burst in self-employment—the number of self-employed workers has risen by 500,000 since the start of the pandemic. That total amounts to a 6% increase in the self-employed, while the overall U.S. employment total remains nearly 3% lower than before the pandemic. From January through October of 2021, 4.5 million applications for federal tax-identification numbers were made to register new businesses, up 56% from the same period in 2019, according to the Census Bureau.

The situation was even worse for practices seeking to hire associates. “I haven’t been able to hire one to retain,” said one frustrated veterinarian. Many openings go years without being filled or even receiving a single application. “I’ve had an ad up for 6+ months with no inquiries,” a respondent noted.

Well over half of survey respondents reported experiencing trouble in meeting their hiring and retention needs. However, a few lucky respondents said that hiring and retaining associates had not posed a problem for their practices. One relayed, “My associate left to be closer to family, not due to the pandemic, and I was able to replace her in a timely fashion.”

Attracting and Retaining Associates

The struggle to attract and retain equine veterinarians has been ongoing and worsening for more than a decade. The number of new graduates entering equine practice has been decreasing. From a high of 5.7% in 2003, this number fell to 1.0% in 2019 before rising to 1.4% in 2020. In the last 20 years, about 50% of new graduates that were AAEP members have let their membership lapse within five years of graduation. It is thought that many of these doc-

tors have left the equine sector. Low wages, long hours, emergency coverage, lifestyle and lack of flexibility have been dogging the equine veterinary industry since well before COVID-19.

The increase in work that equine practices have seen in the last two years has exacerbated the problem. Equine veterinarians are exhausted and cannot see the light at the end of the tunnel. Some practice owners have searched for associates for several years to help carry the load, but they have come up empty-handed.

Nationwide in 2021, across the entire veterinary industry, there were 18.2 positions for veterinarians for each applicant, according to the AVMA. Undoubtedly the hiring landscape is even worse in the equine sector, as many equine veterinarians are moving to companion animal positions every year, driven by higher salaries, shorter hours and no emergency call obligations.

Some good news to offset these challenges is that across the country, equine veterinarians reported that their practices were doing well financially, some dramatically so. In many areas, not a single respondent reported that their practices were doing worse monetarily. This is wonderful in the midst of the pandemic economic downturn, as these increases came due to significant increases in the number of new clients, number of invoices and amount of revenue earned.

Practices were much busier in 2020 than 2019, and when looking at 2021 in comparison to 2020, the increase in workload continued and intensified. The increase in workload burdened practices that were often trying to increase client visits while short on lay staff as well as doctors. The majority of practices’ veterinarians worked more hours, and nearly half saw more emergencies, year over year.

Telemedicine Use

In order to minimize contact with cli-

ents during the pandemic and increase efficiencies in care, many practices began utilizing telemedicine, including assessing patients by text, video, photographs, Zoom meetings or other means. This allowed doctors to determine whether an urgent visit was necessary and assisted in providing re-checks to previously seen patients. While a quarter of respondents did no telemedicine, most did to some degree. Unfortunately, very few practices charged for these consultations, even though veterinarians' professional knowledge and time are really what they sell.

Based on the tradition of in-person visits, it is likely that many veterinarians felt their opinions were of little value without hands-on examinations or felt that clients would be reluctant to pay for their expertise by remote means.

As one doctor explained, "Telemedicine is performed but not charged for. I perceive, and firmly believe it is real, that there is an expectation of availability from equine clients. In order to retain them, there is an expectation that we respond without charge to text questions and after-hours questions, and utilize email/text/photographs as a means to triage emergency vs. non-emergency cases."

However, one out of 10 respondents reported charging \$50 per telemedicine consultation.

This increase in almost all aspects of the practice of equine care was not predicted when the pandemic exploded. Most veterinarians and business con-

sultants assumed the worst, and many practices took out PPP (Paycheck Protection Program) loans to ensure their ability to meet payroll. Instead of the expected downturn, veterinary practices of all kinds saw increases in revenue, invoices and appointments.

The AVMA reported that the growth in companion animal practices was mostly due to existing clients purchasing more services, rather than through an increase in new clients or patients. The 2021 survey described in this article did not distinguish the source of the revenue gains in equine practice. The many equine practices that reported high growth in revenues in 2020 and 2021 received the benefit of increased practice value. This has perhaps accelerated the attention of corporate consolidators.

The reasons for this growth in the equine veterinary industry are multi-faceted. Horse owners are primarily well-educated and wealthier than the general population. At the time of the worst unemployment in April 2020, more than 20% of citizens without a high school diploma were unemployed, contrasted with just 8% of those with a bachelor's degree. Most equine clients were also likely to be employed by jobs that could be done remotely, giving them more time and more money as commuting ceased.

In addition, with the pandemic they had no more dinners out with friends, beach vacations or theater tickets, adding to their discretionary funds. The appeal of horses as a safe outdoor leisure

activity also grew, and more people purchased horses. (Anecdotal, the number of pre-purchase exams done in the last two years has exploded.) Others undoubtedly re-evaluated their priorities and decided that their horses were very important to leading a joyful life.

Take-Home Message

Important questions remain that cannot be answered. Will this growth continue? Can current revenue levels be sustained? Will practices continue to see unprecedented increases at a time when horse numbers have been decreasing for two decades and the cost of horse keeping has risen sharply?

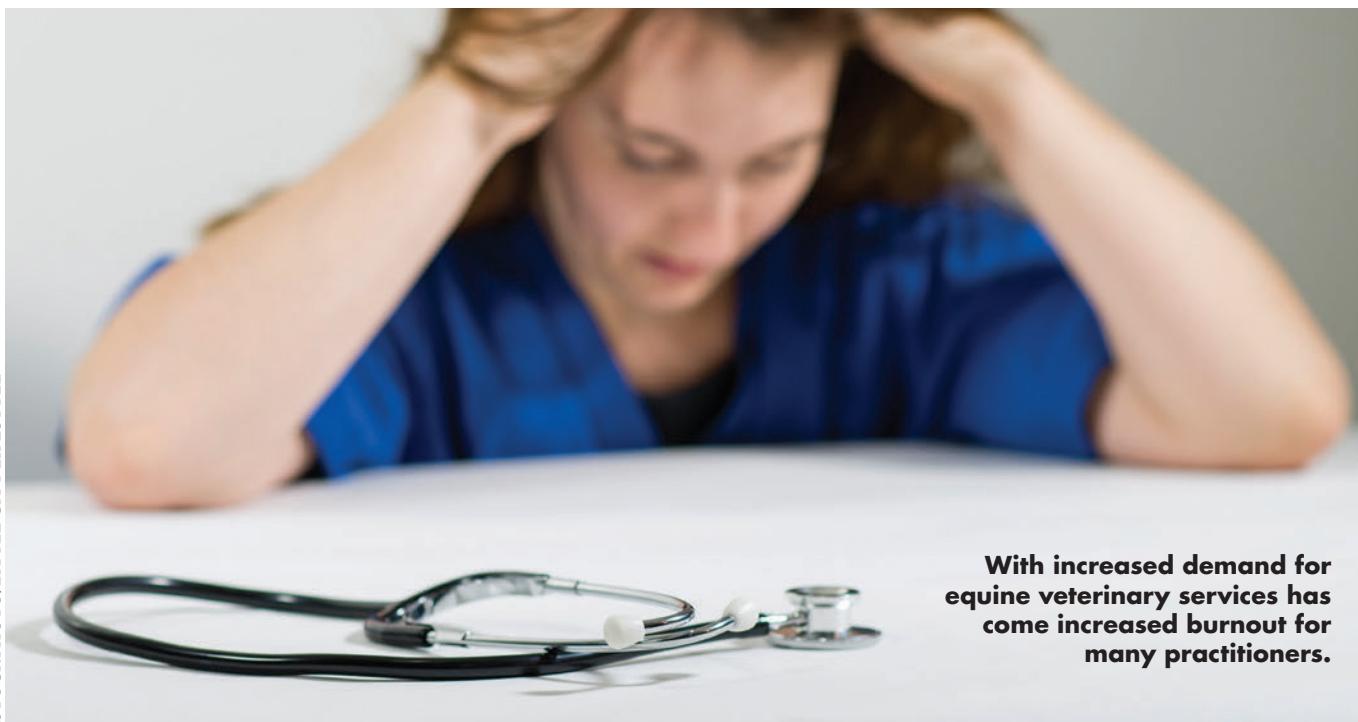
The American Horse Council is planning a survey in 2022, and perhaps its results will elucidate some of these uncertainties.

One thing is certain. With fewer new graduates choosing a career in equine medicine and significant numbers of equine veterinarians transitioning to other sectors or retiring each year, many practices are likely to continue to struggle to fill openings for associates. New paradigms of equine practice must accelerate in order for horses to continue to receive the care they need.

Finding the way forward as an industry will require innovative ideas that allow our changing workforce members to have the flexibility and support that they need while still keeping practices financially healthy. We must all contribute to building a better, more sustainable life for equine practitioners. **EM**

Editor's note: For more on Dr. Grice's survey conducted for EquiManagement in late October/early November 2021, which had 312 equine veterinary respondents, visit EquiManagement.com and search for "State of Equine Veterinary Practice 2021 Survey." You can also read an additional article created from these results on page 54 of this issue.

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With increased demand for equine veterinary services has come increased burnout for many practitioners.

State of Equine Practice 2021 Survey: Wellness Concerns

It is only through change that allows veterinarians to regain their health that our profession will prosper.

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By Amy L. Grice, VMD, MBA

Significant increases in workload have emerged over the past two years, as elucidated in the late 2021 equine veterinary industry survey and highlighted in the article “State of Equine Practice 2021 Survey: Practice Performance” on page 50. Therefore, it is not surprising that stress levels of equine veterinarians rose.

The final questions in “State of Equine Veterinary Practice 2021” (which can

be found in its entirety on EquiManagement.com) addressed the stress that equine veterinarians have experienced due to the increased demand for services at a time when practicing vets can’t hire associates or lay help to share the load.

Survey respondents were asked about how often they experienced feelings related to burnout or compassion fatigue, as well as how often they performed actions of self-care or used coping methods.

The results were concerning.

A majority of the 312 equine veterinarians who responded to the survey are exhausted, and many have lost interest in hobbies or doing things they enjoy. Feeling irritable and short-tempered, drinking alcohol, eating too much or too little, and/or feeling anxious, sad or depressed were common. One in five said they lost their capacity to care at least several times each week, a clear sign of

burnout. Thankfully, losing the capacity to keep caring on a daily basis was not common.

Fortunately, almost half of the respondents were exercising and about a third were connecting with friends regularly each week, seeking to offset their stress.

These responses make it clear that equine veterinarians are struggling in their work and sliding toward burnout and compassion fatigue if they haven't yet arrived.

When stratified by years in the profession, it was clear that older veterinarians were not spared; many of the respondents in this category reported the same stress response as the majority. We cannot know for sure why these more experienced practitioners showed such a response, but perhaps they had experienced a loss of associates, forcing them to work longer hours and cover more emergency shifts in the last several years than they had previously been required to do. The difficulty in hiring associates to share the burden of the recent increased demand for services and emergency coverage—coupled with fears about the future—might have amplified this cohort's suffering.

The least experienced—and presumably younger respondents—reported feeling these stress responses at a higher frequency than other groups of respondents. This percentage continued to fall as experience increased. These findings are consistent with the findings of the 2016 AVMA AAEP Equine Economic Survey, as well as the 2018 and 2021 Merck Animal Health Veterinarian Well-Being studies, each of which found that more recent graduates were more vulnerable to mental health concerns.

The stresses of educational debt, responsibilities of caring for children and low compensation relative to the effort and number of hours worked could be reasons for this disparity.

Healthy and Unhealthy Coping

Many people in society “self-medicate” to ease their stress. In this survey, eating

too much or too little was frequently the “drug of choice” for less experienced practitioners, while those with more than 20 years of experience reported the highest number of respondents with daily consumption of alcohol or other drugs.

Positive daily self-care became more prevalent (and perhaps more possible) with more years in practice. Those equine practitioners who had been several decades in practice were more likely to report daily exercise and connection with friends than those with less experience.

It stands to reason that these older doctors probably did not still have kids at home, thus would have more personal time. The biological imperative of younger female veterinarians to have children soon after graduation (if they desire to have a family) can cause a demand on their time and energy outside of work. They also typically have less control of their work schedules at that stage of their careers. Both of these factors can limit their ability to have time for self-care.

Burnout and Compassion Fatigue

Burnout is defined as a psychological syndrome that occurs as a response to chronic stressors on the job. The three key dimensions of this response are an overwhelming exhaustion, feelings of cynicism and detachment from the job and a sense of ineffectiveness and lack of accomplishment. Studies have shown a significant association between burnout and depression as well as burnout and anxiety.

According to a 2013 study, burnout was on the rise among the “helping” professions such as human and veterinary medicine, and burnout had negatively affected personal and professional well-being and the provision of quality care to clients and animals. Even more significant was the finding that veterinarians were reported to have the highest incidence rate of suicide

among all occupations—twice as high as physicians and dentists, according to the study's authors.¹

Compassion fatigue and burnout are similar but are not interchangeable, according to the AVMA. Compassion fatigue arises from empathy that allows the caregiver to “take on the burden” of the sick or dying patient. Dr. Frank M. Ochberg, a well-known pioneer in trauma science, has described it as “basically ... a low-level, chronic clouding of caring and concern for others in your life—whether you work in or outside the home. Over time, your ability to feel and care for others becomes eroded through overuse of your skills of compassion.”²

Symptoms of compassion fatigue might include apathy, isolation, sadness, inability to enjoy activities that previously were fun, substance abuse or other compulsive behaviors such as over-eating, and mental or physical exhaustion. These signs, and those of burnout, can certainly be seen in the results cited above.

The 2020 Merck Animal Health Veterinarian Well-Being Study surveyed U.S. veterinarians across all sectors of the profession to measure well-being and mental illness and compared findings to the general U.S. population.³ The Merck study found that younger veterinarians were more distressed than older vets, and that suicidal thoughts and attempts among all ages of veterinarians remained about twice that of the general population.

In doctors younger than 45 years of age, only half were thriving, with about 10% suffering and 50% just getting by. On a Burnout Scale of 0-7, this study found that physicians measured 2.24 and veterinarians 3.1, with the general population at 2.0. They also found that only half of veterinarians would recommend entering the career to others.

According to John Volk, results of the 2018 Merck study confirmed that veterinary medicine is a stressful profession, and that even those veterinarians who were mentally healthy and had high

levels of well-being experienced feelings of depression, anxiety, compassion fatigue or burnout with some frequency. He stated that younger veterinarians were most at risk, with a higher prevalence of serious psychological distress and lower well-being index scores.

Contributing factors to stress in these younger veterinarians included high student debt and low income, as well as other professional and personal issues. This 2018 study found that spending time with family and friends, exercising, traveling, reading for pleasure and being in a committed relationship were strongly associated with high well-being and good mental health.⁴

Seeing fewer than half of respondents in the 2021 equine veterinary study undertaking these steps on a weekly or more frequent basis is cause for concern.

Healthy Boundaries and Schedules

Creating healthy boundaries and work schedules that allow time for activities outside of work have not been the traditional culture of equine practice. In many practices, being available for “your” clients 24/7/365 is the expectation, even when not officially on emergency duty. Proudly displayed on one equine practice website are the words: “Emergency coverage means putting the horses and their owners ahead of the interests of family, friends and self. In our practice, it has always meant 24 hours a day, 365 days a year. Birthdays, anniversaries, bad weather, holidays, recreation, personal comfort, sickness, fatigue and injury are ignored when the call comes in.”

While this might be true in many respects—because providing emergency

care is essential in equine practice—sacrificing one’s life on the altar of veterinary medicine is no longer acceptable.

Veterinarians are choosing other career paths in part because of the common expectation that the lifestyle of a horse doctor means having no life of one’s own. When young veterinarians try to live up to these outdated expectations in an attempt to belong to the “tribe” and be accepted and respected, they much too frequently find themselves disillusioned and depressed. They are often told without words that “you don’t deserve to be here.”

A recent study indicated that equine veterinarians leave equine practice primarily due to lifestyle and number of work hours required, emergency on-call duty and mental health and stress.⁵ In many long-established equine practices, the unwritten rule is to work as much as possible, always seeking to grow the practice by saying “yes” to all client requests as the default expectation.

Veterinarians can burn out from never saying “no.”

The culture at some practices to never say “no” is generally intended to increase revenue and business growth. Because equine veterinarians of any age are as a rule full of grit and determination, they will usually soldier on until one day they might simply find they are exhausted, depressed and have nothing left to give.

Take-Home Message

Although sometimes the advice given for overcoming burnout is to become more involved in outside activities, or giving back by volunteering, this really means doing even more! “Just do more” might not be the answer.

With the gender shift in the profession, the majority of equine veterinarians are women. The responsibilities of family, children and household often are theirs, layered on top of their career responsibilities. Keeping these talented doctors in equine practice often requires them saying “no” more often and doing less rather than more.

Moving to a four-day work week with regionally shared emergency duty can also reduce the stress that leads to burnout. Having practice leaders model the way toward multi-dimensional lives is important in building real change in equine practice culture. It is only through change that allows veterinarians to regain their health that our profession will prosper. **EM**

Editor’s note: For more on Dr. Grice’s survey conducted for EquiManagement in late October/early November 2021, which had 312 equine veterinary respondents, visit EquiManagement.com and search for “State of Equine Veterinary Practice 2021 Survey.” Also read an article created from these results on page 50.

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While one must approach the subject of rider/horse suitability delicately, it is a topic that veterinarians must occasionally address.

Recognizing and Relaying Information Regarding Rider/Horse Suitability

At the 2021 AAEP Convention, Dr. Sue Dyson said she believes ‘the veterinary profession has a moral responsibility to advise riders if they are too big for the horse.’

By Stacey Oke, DVM, MSc

While one must approach the subject of rider size delicately, it is a topic that veterinarians must occasionally address. Horse/rider mismatch due to a large rider size might compromise gait as well as thoracolumbar muscle function and development.

It can also increase the risk of musculoskeletal injury in the horse.

“When we refer to rider size, this term incorporates not only weight but also morphology (shape) of rider, as well as height, including trunk and limb length,” advised Sue Dyson, MA, VetMB, PhD.

As there are many horse and rider variables involved, no specific guidelines

currently exist regarding the suitability of rider size. Skill, balance, coordination, fitness and saddle fit all play a role. For the horse you must look at age, fitness, muscle development, length of thoracolumbar region, musculoskeletal pain, type of horse, speed/duration of work, and terrain over which he will be asked to work. All of these play a role in deter-

mining rider suitability.

Dyson reviewed the results of two studies assessing rider size. Study A, performed in the UK by Dyson's group, included four experienced riders with similar abilities ranging from 10% to >20% of the horses' body weights. They each rode six non-lame horses in a cross-over design. Gait was evaluated subjectively and objectively, and behavior was assessed using the ridden horse pain ethogram (RHpE; visit EquiManagement.com and search for "AAEP 2020: Recognizing Musculoskeletal Pain in Ridden Horses").

In Study B, performed in Denmark, 20 horses were ridden by the "normal" rider and again with added weight strapped to the rider so that the total maximum weight ranged from 15% to 23% of each horse's body weight.

For the heavy and very heavy riders in study A, adverse effects of gaits and behavior were appreciated, whereas no effects were noted in study B.

In Study A, the horses were ridden for 30 minutes. But if the horse became lame during the ride, the test was terminated, which happened for all tests for the heavy and very heavy riders. As a result, mean test duration for the very heavy rider was only 8.3 min (range six to 19 min) and mean test duration for the heavy rider was only 16.6 min (range nine to 25 min).

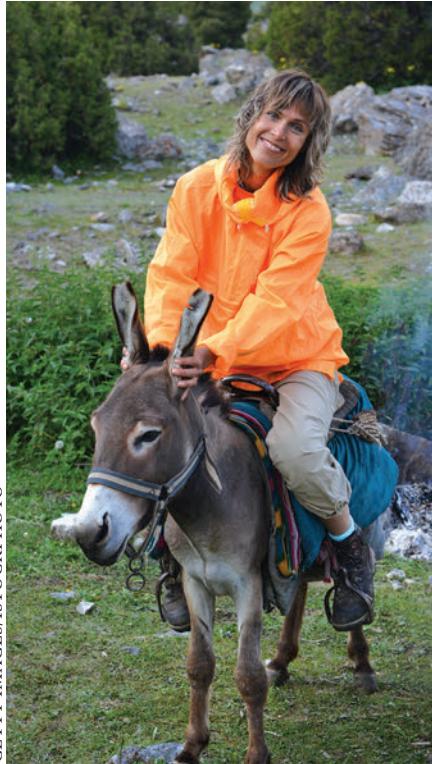
In Study B, the horses were only ridden for five minutes.

So why were there differences in the results of the two studies?

- A large, live rider will have a different effect than dead weight added to a rider; the distribution of forces through the saddle will vary.
- There were large differences in the durations of ridden exercise between the two studies, despite some rides in study A being cut short due to transient lameness.
- The spectrum of behaviors observed was less well described in study B.
- There was a high frequency of be-

haviors (such as head tossing and tail swishing) present at baseline with the normal rider in Study B, suggesting that these horses were already uncomfortable without the extra lead weight. This could conceal the effects of added weight.

No effect on salivary cortisol or heart rate variables—conventional measures of stress—were appreciated in either



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While this is a comical depiction of inappropriate rider/horse weight ratio, vets occasionally need to weigh in on this issue.

study A or B. However, in Study A they observed spontaneous blink rate (a measure of stress) did increase after exercise with the heavy rider.

"When video recordings of the riding sessions were reviewed and the RHpE applied, there was a significantly higher RHpE score for the heavy and very heavy riders in Study A," said Dyson. "In fact, a linear positive correlation between the ratio of rider weight to horse weight and RHpE score existed."

A third study was also reviewed in

which eight Icelandic horses were ridden by a single rider. Weight was added to achieve 20%, 25%, 30% and 35% of the horse's body weight. While no measurable changes in gait symmetry or rhythm were appreciated, there was an increase in "duty factor."

"Duty factor is the proportion of stride time in the stance phase," explained Dyson. "In addition, there was decreased stride length and increased stride frequency seen in all four limbs of the Icelandic horses."

Dyson showed some examples of an increase in duty factor for sporthorses ridden by large riders, both at the trot and the canter. Because of the increased time in the stance phase there was always one limb on the ground when in a trot—or all four limbs on the ground simultaneously during a canter.

Rather than simply focusing on rider size, Dyson said that position of the rider is also important. For optimal rider balance and alignment with the horse's center of gravity, the rider should sit in the middle one-third of the saddle. The larger riders in study A sat on the caudal aspect of the saddle. As a result, the normal increase in thoracic dimensions that occurs when horses work correctly did not happen. In fact, the dimensions decreased with the heavier riders, which might have adverse consequences for long-term muscle development.

"It is inappropriate to give a categorical rider/horse weight ratio because there are too many variables," advised Dyson. "It is also inappropriate to increase the horse's body weight to reduce the rider/horse weight ratio. If we increase the horse's weight, then the increased load puts him at risk of other problems, including musculoskeletal problems."

She added: "Overall, I believe the veterinary profession has a moral responsibility to advise riders if they are too big for the horse. To fail to do so would jeopardize the horse's short- and long-term welfare." **EM**

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Mitigating Risk in Equine Veterinary Practice

Running a veterinary business involves many decisions beyond those associated with veterinary medicine.

By Amy L. Grice, VMD, MBA

Risk mitigation is important to protect your equine veterinary practice and the assets of the practice owners. Risk can be managed in several ways: Accepting the risk and planning for it; transferring the risk by insuring against it; and eliminating the risk by removing items that might generate it.

Accepting Risk and Planning for It

There is risk simply in running a business, and consequently all known risks should be minimized through effective

management. Risk management of business can be accomplished by implementing good policies and procedures at your practice, including human resources and employment procedures, OSHA training, DEA-controlled substance protocols and other areas of regulatory compliance.

Best practices for human resources are not difficult but can require effort. Human resource challenges for veterinary clinics include hiring the right team, creating and maintaining a positive company culture, and complying with ever-changing laws and regulations. From the very first day you interview a candidate or an employee is hired, there

are HR laws and regulations covering everything from payroll to employee discrimination and harassment to termination. Fortunately, this information is widely available.

Occupational Safety & Health Administration (OSHA) compliance is not an option; it's a necessity. Each violation could cost you dearly, as the average fine levied per violation by the federal Occupational Safety and Health Administration is around \$1,000. Few veterinary practices are fully OSHA compliant. One of the important aspects is the Globally Harmonized System of Classification and Labeling of Chemicals, also known

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¹ Data on file. Merck Animal Health.



Employees of your practice should receive safety and OSHA compliance training and annual refresher courses.

as the GHS protocols. These protocols make the hazards associated with chemicals more understandable and uniformly recognized nationally. OSHA wants all employees to not just be told about hazardous chemicals, but to fully understand their dangers and how to be safe around them.

Each practice should have a hazard communication plan and an annual safety review, as well as OSHA safety training meetings. Documents should certify that employees have been trained and understand risks, and that they know the proper use of hazardous chemicals and protective equipment. All new employees should receive safety training and be trained in OSHA compliance, and refresher training should be provided for all employees once a year. Other necessary documents required by OSHA are health records and emergency contact information for each employee. Protection of employees is the responsibility of the practice. Resources that can assist in becoming compliant include: www.avmaplit.com/education/safety-manual and www.safetyvet.com.

Compliance with Drug Enforcement Administration (DEA) Controlled Substance regulations is especially important because loss of DEA licensure can make practicing very difficult. Fines

can be high, especially for practices clearly and grossly out of compliance. A previous article on *EquiManagement.com* (search for “Controlled Drugs and Compliance for Equine Veterinarians” and a paper in the 2019 AAEP Annual Convention *Proceedings* that outlined many of the necessary steps. Other resources include:

- Title 21 Code of Federal Regulations, PART 1300-END, found at <https://www.deadiversion.usdoj.gov/21cfr/cfr/index.html>
- Practitioners Guide: <https://www.deadiversion.usdoj.gov/pubs/manuals/pract/index.html>
- Security Guide: <https://www.deadiversion.usdoj.gov/pubs/manuals/sec/index.html>.

There are other risks specific to equine veterinary practice. Because horses—especially when they are frightened or uncomfortable—can cause serious injuries to handlers, you should train your staff thoroughly in safe handling methods. Institute policies that address safety measures in the workplace, minimize client restraint of their own horses during examination and treatment whenever possible, and never allow minors to assist you. In your absence, there need to be written protocols in place so all of your staff members know how to

proceed in case of an adverse event.

Remember that as the professional in charge, you are liable for all injuries associated with a veterinary visit, even on other people’s property. You should be proactive rather than reactive.

Keeping good medical records is a simple way to minimize the risk associated with threats of malpractice. Because clients unfortunately might seek legal redress when they are dissatisfied with clinical outcome or the amount of an outstanding bill, having clear medical records can be one of your strongest defenses. In addition, equine practices should be sure to have signed documents from all owners of patients authorizing care and agreeing to pay for it. These statements can be readily added to the forms that new clients fill out when engaging your services.

A good medical record answers the questions Who, What, Where, When and How. Any professional should be able to read the medical record and reconstruct what occurred during the visit. If a medication is administered, the record should state the amount given (preferably in mg or g rather than in ml) and the route of administration. If instructions are given to the owner for further care, or recommendations are made that are declined, these should be memorialized in the medical record.

Remember that in a court of law, if it isn’t written down, it essentially never happened.

For a practice owner, regular medical records auditing is a good practice. Ultimately you are responsible for the quality of care given by your associates and the documentation of that care. Start a conversation with your staff about the importance of complete medical records and enlist them in brainstorming ideas on how to do this most efficiently.

Transferring Risk by Insuring Against It

Insuring against risk is prudent, and



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- **Deep penetrating formula** for effective action
- Conditions skin and coat to **speed healing** without burning or irritation



there are many separate risks that need to be considered by veterinary practice owners. Business ownership liability insurance, building and contents insurance, life insurance and disability insurance are essential for practice owners. A personal umbrella policy is indicated for any owner with significant net worth; this will typically cover liabilities that exceed the coverage on existing business and personal liability policies. In cases of attempted legal recovery of damages, generally the deepest pockets are eyed as the primary recovery source. Typically that is the practice owner.

Professional liability insurance is very important for equine practitioners, as a patient's worth can run to millions of dollars. It is not uncommon for horse owners to authorize treatment but decline to pay their bills in the event of a poor outcome. A claim of malpractice often follows. Having adequate insurance is essential.

Life insurance and disability insurance are appropriate for all equine veterinarians. Equine practice is inherently dangerous. Protecting your family in the event of your injury or death is essential, although it might be difficult to think about that possibility. Disability insurance is income protection for a veterinarian who is a primary breadwinner for his or her family, and it also might be required by a bank or lender.

The need for income protection might phase out over time as owners acquire more net worth and the ability to self-insure, but due to the high risk of injury in equine practice, maintaining this insurance throughout your career is recommended.

Life insurance generally comes into play under two different circumstances. The first is for family protection in the event of untimely death. Term insurance is routinely recommended until bank

loans are paid off and is needed unless enough net worth is acquired to self-insure. Second, it is useful for buyout insurance between partners in the event of one partner's untimely death. This can be structured in several ways, with either the practice and/or individuals as beneficiaries, but the plan, pricing and the use of the proceeds should be memorialized in writing so there is no uncertainty as to the insurance uses in the event of a death.

Eliminating Risk by Removing Items That Might Generate It

The last portion of risk mitigation involves eliminating items, services or



Occupational Safety and Health compliance is not an option, and fines can be hefty.

people that might generate unacceptable risk. The choices you make related to products you use, employees you elect to keep and services you offer will all affect the amount of risk you bear.

Minimizing the use of compounded medications can reduce the risk of uninsured adverse events. If certain employees see themselves as expert horse handlers but repeatedly fail to follow your safety protocols, they might need to seek other employment opportunities.

Some practices decide the liability of performing prepurchase exams is not worth the income. Others choose not to collect stallions due to the physical risks

this can pose to themselves and their staffs. Most practices do not allow staff members to ride client horses for veterinary evaluation, but a few unwisely do. Discussing tolerance for risk among the practice owners will help the group make the best decisions for the business.

Minimizing risk also requires compliance with all regulatory and tax reporting requirements. Remove risk by hiring professionals (such as accountants and attorneys) to assist the practice in meeting its regulatory obligations. Compliance with all mandatory governmental and professional directives is your best defense against unnecessary risk. Keeping current with changing regulations is mandatory to stay in compliance.

As an example, business owners who offer 401(k) plans are charged with significant responsibilities. Department of Labor 401(k) regulations require significant reporting to employees by plan fiduciaries, including annual benchmarking of both fees and returns as well as fiduciary requirements by the administrator to utilize this information in their decision-making related to the plan.

In many veterinary 401(k) plans, the practice owner is the plan fiduciary, and that person is personally liable if he or she does not uphold his or her fiduciary duty. Therefore, it is recommended that business owners employ 401(k) plan sponsors who will assume the plan fiduciary responsibility.

Take-Home Message

Running an equine veterinary business involves many decisions beyond those associated with veterinary medicine. Creating appropriate policies and procedures, and working with a team of knowledgeable professionals, will help you grow your business and prevent avoidable losses. **EM**



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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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Bisphosphonate.

For use in horses only.

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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Early diagnosis and treatment of infertile mares by screening plasma ACTH could improve reproductive performance.

GETTY IMAGES



Kester News Hour: Reproduction

Stay up to date with these reproduction reports from the 2021 AAEP Convention's Kester News Hour.

By Stacey Oke, DVM, MSc

The Kester News Hour at the 2021 AAEP Convention was packed, as usual. Four articles focusing on equine reproduction were deemed “convention-worthy” and were summarized by Regina M. Turner, BA, VMD, PhD, DACT, professor of Reproduction and Behavior, New Bolton Center, University of Pennsylvania School of Veterinary Medicine.

Link Between High ACTH and Subfertility

The first study was designed to evaluate the role of pituitary pars intermedia dysfunction (PPID, also known as equine Cushing's disease) and endogenous



ARNOLD BRONKHORST PHOTOGRAPHY

Researchers looked at finding retained testicular tissue with hCG administration.

adrenocorticotrophic hormone (ACTH) levels on reproductive performance in mares that had previously failed to conceive. The study authors recruited 67 Thoroughbred broodmares (4-22 years of age) that were managed and bred at various breeding farms in Japan. All of the mares were apparently healthy but failed to conceive in the 2017 breeding season. None of the mares were on any medications.

In the fall of 2017, morning blood samples were collected from these infertile mares to measure ACTH, insulin, cortisol and blood glucose. Based on the ACTH concentrations, mares were divided into three groups: low ACTH (<50 pg/mL); intermediate ACTH (50-100 pg/

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Kester News Hour presenters (from left) were Drs. Sherry Johnson, Regina Turner, Katie Garrett and Amy Johnson.

mL); and high ACTH (>100 pg/mL).

The next spring (2018), data regarding mating and conception rates and, ultimately, delivery rates were reviewed. The relationships between ACTH, insulin, cortisol, glucose, number of matings, conception rates and delivery rates were examined.

“Full reproductive work-ups were performed in all mares, and there was no difference in age between the three groups,” relayed Turner.

This is important because it can be hard to determine if decreased fertility is associated with PPID versus age. Because there were no differences in age among the three groups, it allowed the researchers to focus more specifically on a potential association between high ACTH and reduced fertility.

According to Turner, the key finding was that pregnancy rates in the next breeding season and live foaling rates were much lower in the high ACTH group.

“Two-thirds of the sub-fertile mares had high ACTH, suggesting an association between high ACTH, PPID and reproductive performance,” relayed Turner.

The study authors concluded, “Early diagnosis and treatment of infertile

broodmares by screening plasma ACTH concentrations could help improve reproductive performance.”

Evaluating the study in more depth, Turner pointed out some potentially important limitations. No fertile controls were included and therefore we do not know if similar increases in ACTH might also be present in fertile mares. There was no attempt to confirm a cause-and-effect relationship between high ACTH levels and fertility. The significance of a single measurement of high ACTH is questionable, and the mares in this study didn’t undergo any additional or more in-depth testing for PPID (e.g., TRH stimulation test). Finally, no mares were treated with pergolide to assess response to treatment.

Nonetheless, Turner advised, “If you have a sub-fertile mare, it might be worthwhile checking the ACTH levels and working the case up further if those ACTH levels are elevated.”

Reference: Tsuchiya, T.; Noda, R.; Ikeda, H.; et al. Relationship between endogenous plasma adrenocorticotropic hormone concentration and reproductive performance in Thoroughbred broodmares. *J Vet Intern Med* 2021;35(4):2002-8.

Replacing Flunixin with Firocoxib When Managing Mares with Ascending Placentitis

The purpose of the second article Turner reviewed was to evaluate the anti-inflammatory effect of firocoxib in mares with placentitis by measuring pro-inflammatory mediators such as prostaglandins (PG) E2 and F2a in fetal fluids. While bacterial infection—often *Streptococcus equi* subsp. *Zooepidemicus*—initiates ascending placentitis, the secondary inflammation accompanied with increased production of PGs and other inflammatory mediators is what’s ultimately responsible for initiation of premature delivery.

“The pillars for treating an ascending placentitis include antimicrobials, a progestin and anti-inflammatory drugs,” relayed Turner. She added, “Flunixin meglumine has historically been the first anti-inflammatory drug that veterinarians reach for.”

Flunixin is, however, nonselective in that it blocks both cyclo-oxygenase 1 and 2. As a result, gastric ulcers and renal disease might develop with administration of this medication, especially if given for a long period of time. In contrast, firocoxib blocks only cyclo-oxygenase 2 and is therefore associated with fewer adverse effects.

“But firocoxib hasn’t been studied in horses with placentitis to show if it has potent enough anti-inflammatory effects to prevent pregnancy loss in affected mares,” Turner said.

Eighteen mares between 270 and 300 days gestation were included in the study, and an ascending placentitis was experimentally induced by intracervical inoculation of *S. Zooepidemicus*. Mares were then divided into one of three groups: infected but not treated, infected and treated with firocoxib, and an uninfected and untreated control group.

Allantocentesis was performed on all mares between six and eight hours

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Source: Survey conducted among equine veterinarians who recommended oral joint health supplements.
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Nocardioform placentitis research has shown differences between that issue and ascending placentitis.

after bacterial inoculation and again 24 hours later. Allantoic and amniotic fluid was also collected at the time the chorioallantois ruptured at parturition. Inflammatory mediators in those fluids were measured and compared among the three treatment groups.

“Significant reductions in inflammatory mediators in the allantoic fluid in treated mares was noted. We can therefore recommend firocoxib over flunixin because it effectively blocked inflammation and it is safer, especially since mares with placentitis are often kept on anti-inflammatory drugs long-term until they foal,” relayed Turner.

According to Turner, the following aspects of the study should be appreciated:

- Firocoxib administration was initiated three days *before* bacterial inoculation. In a real-life situation, you are not going to have this “head start” on treatment;
- A head-to-head comparison between firocoxib and flunixin was not performed; and
- The best combination of medications for the management of ascending placentitis was not established, although this was not a stated goal of the study.

Reference: Macpherson, M.L.; Giguère, S.; Pozor, M.A.; et al. Evidence for anti-inflammatory effects of firocoxib administered to mares with experimentally induced placentitis. *Am J Reprod Immunol* 2021;86(1):e13396.

What’s New with Nocardioform?

The third article reviewed by Turner was a general overview of the clinical, pathologic and epidemiologic features of nocardioform placentitis (NP).

To lay the foundation for this work, Turner reminded conference attendees that placentitis is generally well accepted as being bad news. Ascending placentitis—where bacteria travel up through the cervix and land on the cervical star of the chorion—is the most common form of placentitis in mares.

“Another form of placentitis that practitioners should be aware of is nocardioform placentitis. No one really knows how mares get nocardioform placentitis, and while it was originally thought to be a central Kentucky problem, cases throughout the U.S. and globally have recently been reported,” relayed Turner.

Experts have been unable to re-create nocardioform placentitis experimentally, which means that no model exists to study the disease in a controlled fashion.

As a result, veterinarians are reliant on data from field cases. Theriogenology researchers from the University of Kentucky used such data from a recent outbreak to describe what happens in mares with nocardioform placentitis.

Compared with normal, healthy pregnant mares, those with nocardioform placentitis:

- had premature udder development;
- were older mares;

- had smaller foals at birth; and
- were more likely to abort.

If mares were treated with prophylactic antimicrobials and progestins, they were still as likely to develop nocardioform placentitis as mares that did not receive any potential preventative medications.

“Exposure to other mares with NP did not increase a mare’s chances of becoming infected, suggesting that NP is *not* spread from mare to mare,” said Turner.

And while the foals from nocardioform placentitis mares were smaller, they were still healthy.

Further, the future fertility of nocardioform placentitis mares was unaffected. In other words, a previous diagnosis of nocardioform placentitis did not increase chances of mares becoming infected again.

Turner pointed out a few important differences between ascending placentitis and nocardioform placentitis. First, placental lesions for nocardioform placentitis are located in the uterine body and horns rather than cervical star, where veterinarians typically see ascending placentitis.

“Second, NP placentas are easily recognized by the brown, mucoid, ‘goeey stuff’ on the placenta,” said Turner.

Likely because the lesion is far more cranial compared to mares with an ascending placentitis, there is no evidence of vulvar discharge with nocardioform placentitis. The diagnosis, according to Turner, is typically made when an owner notices premature udder development in a pregnant mare.

“This should prompt the veterinarian to perform an ultrasound examination of the pregnancy per rectum. If no abnormalities are seen in the region of the cervical star, a transabdominal ultrasound examination should be performed. If at that time classic placentitis lesions are observed in the region of the uterine body or uterine horns, NP should be suspected. Alternatively, NP can be suspected and diagnosed after the foal



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

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

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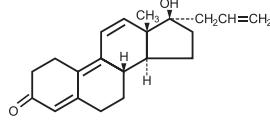


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SOLUTION 0.22% (2.2 mg/mL)

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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:

- In filly offspring (all ages) of treated mares, clitoral size was increased.
- Filly offspring from treated mares had shorter interval from Feb. 1 to first ovulation than fillies from their untreated mare counterparts.
- 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:

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

is delivered based on the location and appearance of the placental lesions.

“NP is an emerging disease that is not limited to Kentucky,” Turner stated. “There is an increased incidence of cases following hot, dry, late summers, the repercussions of which are observed in the next foaling season. With climate change, we will likely see more NP in the future.”

Reference: Fedorka, C.E.; Scogin, K.E.; Ruby, R.E.; et al. Clinical, pathologic, and epidemiologic features of nocardioform placentitis in the mare. *Theriogenology* 2021;171:155-61.

hCG Stimulation Test Optimization for Detecting Testicular Tissue

The purpose of the fourth study presented by Turner was to determine the best time to sample blood for testosterone and estrone sulfate when conducting a human chorionic gonadotropin (hCG) stimulation test. This test is used clinically to confirm complete removal of testicular tissue and can therefore be used to help recognize cryptorchids, for example.

The star-studded research team involving experts from both the Gluck Equine Research Center and Hagyard Equine Medical Institute recruited eight pony stallions, four of which served as controls. The four pony stallions included in the treatment group were administered 5000 IU hCG IV. Blood samples were serially collected to measure testosterone levels.

“Significant elevations in testosterone at one hour, then again [at] 48, 72 and 96 hours after hCG, were appreciated. Elevated levels at 12 and 24 hours were also significant, but not nearly as prominent,” relayed Turner.

In contrast, no change in estrone sulfate over time occurred, and this hormone was therefore deemed not useful for recognizing testicular tissue

in response to hCG in male horses.

All ponies were subsequently castrated and testosterone levels measured.

“Testosterone had a very short half-life, dropping to previously published normal ‘gelding levels’ as soon as 24 hours after castration,” said Turner. “So, for example, if you purchase a horse that has only one scrotal testicle and you aren’t sure if the other testicle was previously removed or is still present in the abdomen, you can remove the scrotal testis routinely and, within 24 hours, you can check testosterone levels. If it has decreased to gelding levels, then you know that all testicular tissue has been removed. But if testosterone is still high, you know there is still testicular tissue present and you need to start a hunt for a cryptorchid testicle.”

In summary, there is a biphasic increase in testosterone after hCG administration in the hCG stimulation test. The best time to measure testosterone appears to be either one hour after hCG administration or, even better, between 48 and 96 hours after hCG administration.

Adding her own thoughts on the subject, Turner noted, “This study was conducted using young, 2-year-old colts with two descended testes. Retained testicles may not produce as much testosterone as a descended testicle so, in a suspected cryptorchid horse, it might be even more important to measure testosterone levels more than 24 hours after hCG stimulation, when the response should be at a maximum.”

Reference: Esteller-Vico, A.; Ball, B.A.; Bridges, J.W.; et al. Changes in circulating concentrations of testosterone and estrone sulfate after human chorionic gonadotropin administration and subsequent to castration of 2-year-old stallions. *Anim Reprod Sci* 2021;225:106670. **EM**



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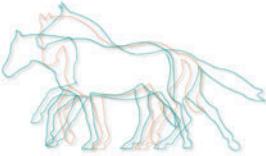
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Equine Eye Ulcers

Dr. Dennis Brooks discusses his method of diagnosing and treating corneal ulcers in horses.

By Nancy S. Loving, DVM

A horse's eye provides a great deal of information about a horse's health and state of mind—including behavioral cues—and of course reflects the health of the eye and surrounding structures. When a horse suffers from an eye ulcer, many of those structures become involved.

The outermost epithelial layer of the cornea has been described as the windshield of the eye that protects and supports underlying tissues. Beneath the epithelium lies the stroma, which is the thickest layer of the cornea and is comprised of collagen and fibroblasts. Interior to the stroma is the thin basement membrane—Descemet's membrane—



Eye patch used to cover a horse's face after eye removal for glaucoma

which is only the thickness of six red blood cells (42 microns). In the deepest portion of the cornea is a single-cell endothelial layer that pumps accumulated fluid from the cornea's interior.

All Things Eye

At the 2020 NAEP (Northeast Association of Equine Practitioners) meeting, Dennis Brooks, DVM, PhD, DACVO, gave an inspiring lecture about "all things eye." He emphasized that the cornea is one of the most sensitive structures in the body. A defect in the corneal epithelium, i.e., a corneal ulcer, is usually classified based on depth, cause and response to treatment. A corneal ulcer usually results in a painful eye. A painful



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INDICATION BetaVet® (betamethasone sodium phosphate and betamethasone acetate injectable suspension) is indicated for the control of pain and inflammation associated with osteoarthritis in horses.

IMPORTANT SAFETY INFORMATION For **Intra-articular** (I.A.) use in Horses. **CONTRAINDICATIONS** BetaVet® is contraindicated in horses with hypersensitivity to betamethasone. Intra-articular injection of corticosteroids for local effect is contraindicated in the presence of septic arthritis.

WARNINGS: Do not use in horses intended for human consumption. Clinical and experimental data have demonstrated that corticosteroids administered orally or parenterally to animals may induce the first stage of parturition when administered during the last trimester of pregnancy and may precipitate premature parturition followed by dystocia, fetal death, retained placenta, and metritis. Additionally, corticosteroids administered to dogs, rabbits and rodents during pregnancy have resulted in congenital anomalies. Before use of corticosteroids in pregnant animals, the possible benefits should be weighed against potential hazards. **Human Warnings:** Not for use in humans. Keep this and all medications out of the reach of children. **PRECAUTIONS:** Corticosteroids, including BetaVet®, administered intra-articularly are systemically absorbed. Do not use in horses with acute infections. Acute moderate to severe exacerbation of pain, further loss of joint motion, fever, or malaise within several days following intra-articular injection may indicate a septic process. Because of the anti-inflammatory action of corticosteroids, signs of infection in the treated joint may be masked. Due to the potential for exacerbation of clinical signs of laminitis, glucocorticoids should be used with caution in horses with a history of laminitis, or horses

otherwise at a higher risk for laminitis. Use with caution in horses with chronic nephritis, equine pituitary pars intermedia dysfunction (PPID), and congestive heart failure. Concurrent use of other anti-inflammatory drugs, should be approached with caution. Consider appropriate wash out times prior to administering additional NSAIDs or corticosteroids. **ADVERSE REACTIONS:** Adverse reactions reported during a field study of 239 horses of various breeds which had been administered either BetaVet® (n=119) or a saline control (n=120) at five percent (5%) and above were: acute joint effusion and/or local injection site swelling (within 2 days of injection), 15% BetaVet® and 13% saline control; increased lameness (within the first 5 days), 6.7% BetaVet® and 8.3% saline control; loose stool, 5.9% BetaVet® and 8.3% saline control; increased heat in joint, 2.5% BetaVet® and 5% saline control; and depression, 5.9% BetaVet® and 1.6% saline control. **SHAKE WELL IMMEDIATELY BEFORE USE.** For additional safety information, please see full prescribing information. **CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.**

References: 1. Trotter GW. Intra-articular corticosteroids. In: Mollwraith CW, Trotter GW, eds. Joint Disease in the Horse. Philadelphia: W.B. Saunders; 1996; 237-256.



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[Betamethasone Sodium Phosphate and Betamethasone Acetate Injectable Suspension] 6 mg betamethasone per mL
For Intra-Articular (I.A.) Use in Horses

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

INDICATION: BetaVet[®] is indicated for the control of pain and inflammation associated with osteoarthritis in horses.

DOSAGE AND ADMINISTRATION: Shake well immediately before use.

CONTRAINDICATIONS: BetaVet[®] is contraindicated in horses with hypersensitivity to betamethasone. Intra-articular injection of corticosteroids for local effect is contraindicated in the presence of septic arthritis.

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

Clinical and experimental data have demonstrated that corticosteroids administered orally or parenterally to animals may induce the first stage of parturition when administered during the last trimester of pregnancy and may precipitate premature parturition followed by dystocia, fetal death, retained placenta, and metritis. Additionally, corticosteroids administered to dogs, rabbits and rodents during pregnancy have resulted in cleft palate in offspring. Corticosteroids administered to dogs during pregnancy have also resulted in other congenital anomalies including deformed forelegs, phocomelia and anasarca. Therefore, before use of corticosteroids in pregnant animals, the possible benefits to the pregnant animal should be weighed against potential hazards to its developing embryo or fetus. **Human Warnings:** Not for use in humans. For use in animals only. Keep this and all medications out of the reach of children. Consult a physician in the case of accidental human exposure.

PRECAUTIONS: Corticosteroids, including BetaVet[®], administered intra-articularly are systemically absorbed. Do not use in horses with acute infections. Acute moderate to severe exacerbation of pain, further loss of joint motion, fever, or malaise within several days following intra-articular injection may indicate a septic process. Because of the anti-inflammatory action of corticosteroids, signs of infection in the treated joint may be masked. Appropriate examination of joint fluid is necessary to exclude a septic process. If a bacterial infection is present, appropriate antibacterial therapy should be instituted immediately. Additional doses of corticosteroids should not be administered until joint sepsis has been definitively ruled out. Due to the potential for exacerbation of clinical signs of laminitis, glucocorticoids should be used with caution in horses with a history of laminitis, or horses otherwise at a higher risk for laminitis. Use with caution in horses with chronic nephritis, equine pituitary pars intermedia dysfunction (PPID), and congestive heart failure. Concurrent use of other anti-inflammatory drugs, such as NSAIDs or other corticosteroids, should be approached with caution. Due to the potential for systemic exposure, concomitant use of NSAIDs and corticosteroids may increase the risk of gastrointestinal, renal, and other toxicity. Consider appropriate wash out times prior to administering additional NSAIDs or corticosteroids.

ADVERSE REACTIONS: Adverse reactions reported during a field study of 239 horses of various breeds which had been administered either BetaVet[®] (n=119) or a saline control (n=120) were: acute joint effusion and/or local injection site swelling [within 2 days of injection], 15% BetaVet[®] and 13% saline control; increased lameness (within the first 5 days), 6.7% BetaVet[®] and 8.3% saline control; loose stool, 5.9% BetaVet[®] and 8.3% saline control; increased heat in joint, 2.5% BetaVet[®] and 5% saline control; depression, 5.9% BetaVet[®] and 1.6% saline control; agitation/anxiety, 4.2% BetaVet[®] and 2.5% saline control; delayed swelling of treated joint (5 or more days after injection), 2.5% BetaVet[®] and 3.3% saline control; inappetance, 3.4% BetaVet[®] and 2.5% saline control; dry stool, 1.7% BetaVet[®] and 0% saline control; excessive sweating, 0.8% BetaVet[®] and 0% saline control; acute non-weight bearing lameness, 0.8% BetaVet[®] and 0% saline control; and laminitis, 0.8% BetaVet[®] and 0% saline control.

CLINICAL PHARMACOLOGY: Betamethasone is a potent glucocorticoid steroid with anti-inflammatory and immunosuppressive properties. Depending upon their physico-chemical properties, drugs administered intra-articularly may enter the general circulation because the synovial joint cavity is in direct equilibrium with the surrounding blood supply. After the intra-articular administration of 9 mg BetaVet[®] in horses, there were quantifiable concentrations of betamethasone (above 1.0 ng/mL) in the plasma.

EFFECTIVENESS: A negative control, randomized, masked field study provided data to evaluate the effectiveness of BetaVet[®] administered at 1.5 mL (9 mg betamethasone) once intra-articularly for the control of pain and inflammation associated with osteoarthritis in horses. Clinical success was defined as improvement in one lameness grade according to the AAEP lameness scoring system on Day 5 following treatment. The success rate for horses in the BetaVet[®] group was statistically significantly different (p=0.0061) than that in the saline group, with success rates of 75.73% and 52.52%, respectively (back-transformed from the logistic regression).

ANIMAL SAFETY: A 3-week target animal safety (TAS) study was conducted to evaluate the safety of BetaVet[®] in mature, healthy horses. Treatment groups included a control (isotonic saline at a volume equivalent to the 4x group); 1X (0.0225 mg betamethasone per pound bodyweight; BetaVet[®]); 2X (0.045 mg betamethasone per pound bodyweight; BetaVet[®]) and 4X (0.09 mg betamethasone per pound bodyweight; BetaVet[®]). Treatments were administered by intra-articular injection into the left middle carpal joint once every 5-days for 3 treatments. Injection site reactions were the most common observations in all treatment groups. Injection site reactions were observed within 1 hour of dosing and included swelling at the injection site, lameness/stiffness of the left front limb, and flexing the left front knee at rest. The injection site reactions ranged from slight swelling (in many horses on multiple days in all treatment groups) to excessive fluid with swelling, pain, and lameness (4x group only). Injection site reactions were observed most commonly on treatment days, and generally decreased in number and severity over subsequent days. The incidence of injection site reactions increased after the second and third injection (number of abnormalities noted on day 10 > day 5 > day 0). In the BetaVet[®] treated groups the number and severity of the injection site reactions were dose dependent. The 4X BetaVet[®] group had the highest overall incidence of and severity of injection site reactions, which included heat, swelling, pain, bleeding, and holding the limb up at rest. The control group and 4X group (which received similar injection volumes) had a similar incidence of injection site reactions; however, the severity of reactions was greater in the 4X group. Absolute neutrophils were statistically significantly higher in the BetaVet[®] treated groups as compared to the control group. Trends toward a decrease in lymphocytes and eosinophils, and an increase in monocytes were identified in the BetaVet[®] treated groups after the initial dose of BetaVet[®]. Individual animal values for white blood cells generally remained within the reference range. BetaVet[®] treated horses also had a trend toward increased blood glucose after the initial dose. Some individual animals showed mild increases in blood glucose above the reference range.

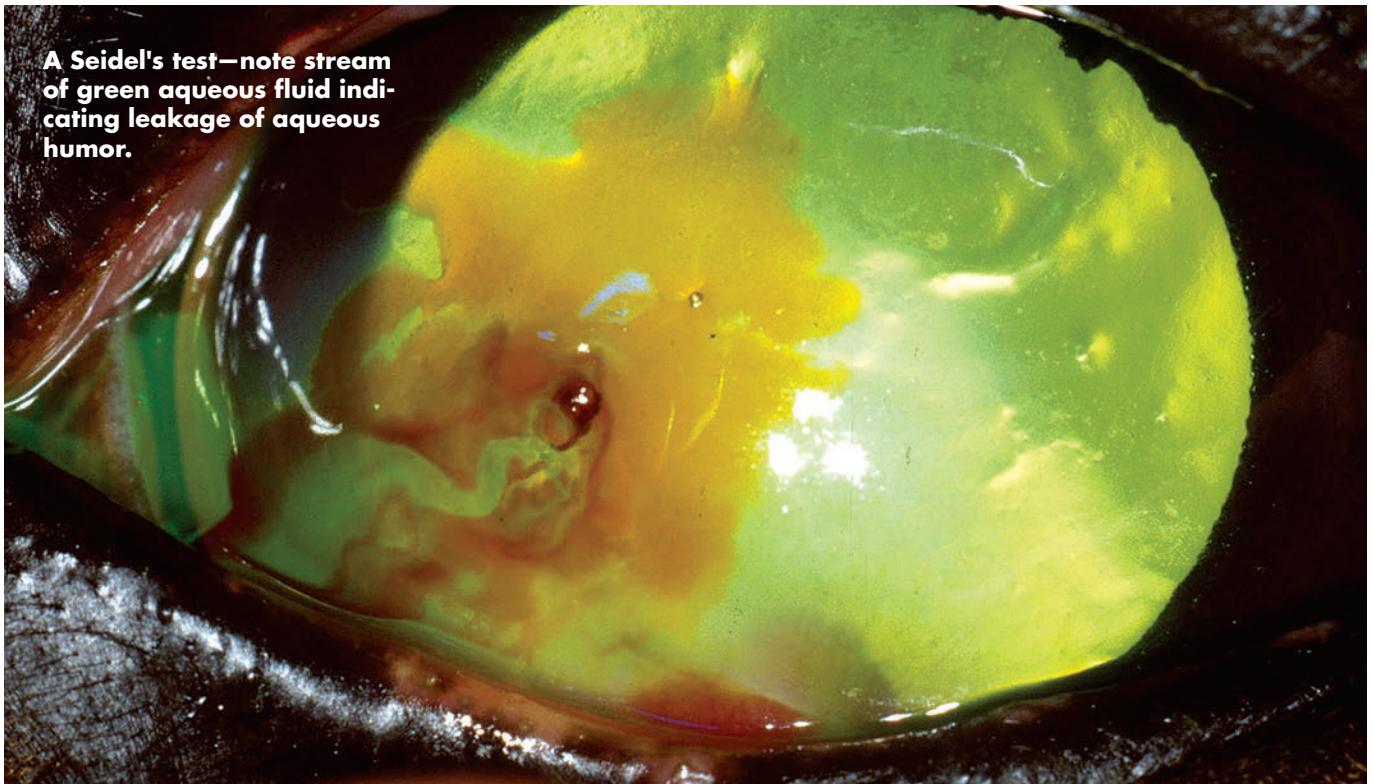
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A Seidel's test—note stream of green aqueous fluid indicating leakage of aqueous humor.

eye is usually accompanied by epiphora, conjunctivitis, local soft tissue swelling, photophobia and blepharospasm.

A subtle sign of eye discomfort is a downward drooping of the lashes of the upper lid; this is one of the last things to return to a normal position with resolution of an ulcer. In some cases, a horse might experience conjunctival ulcers, so it is important to look beneath the lids.

Diagnostic Tools

An important part of an eye exam evaluates corneal clarity and colors, which are indicators of health or problems. White is associated with an abscess or necrosis, blue discoloration is consistent with corneal edema expected with an ulcer, red indicates blood vessel entry for healing, while a dark color (especially of a furrow or gutter) means the cornea is “melting” and is of concern for imminent rupture.

Normally, the corneal epithelium is only 0.77–1.5 mm thick. Staining the eye with fluorescein dye identifies defects in the corneal epithelium and



Here Dr. Dennis Brooks is using a microscope for equine corneal surgery.

reveals the extent of an ulcer.

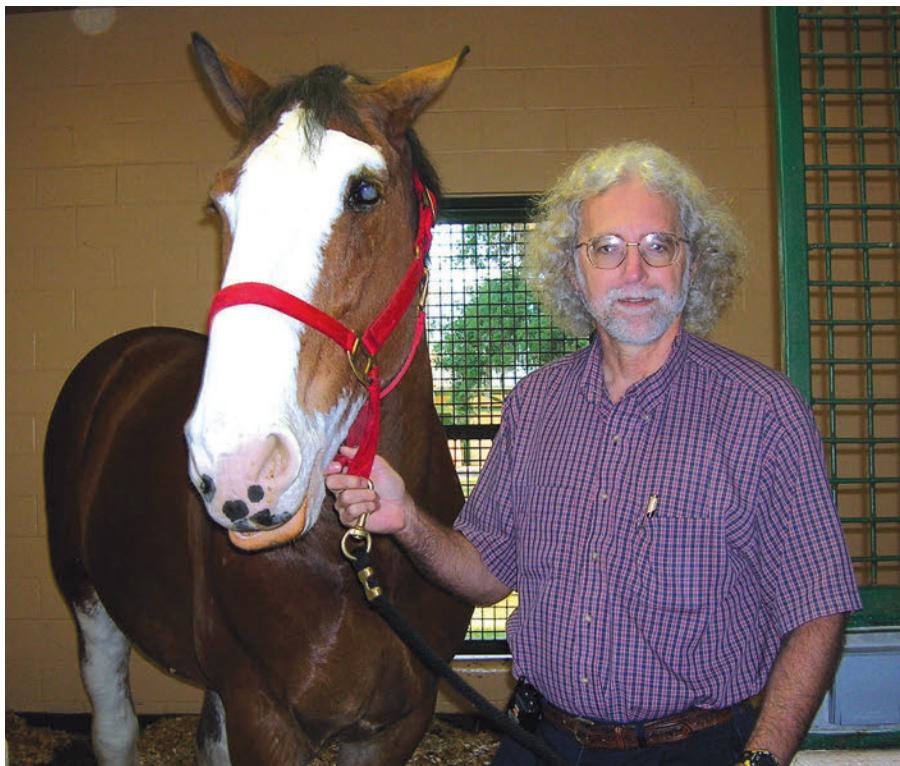
If the epithelial surface of the eight-layer thick cornea is breached, fluorescein dye will outline the erosion or ulcer even with a layer or two missing. Full-strength fluorescein dye helps

to define an ulcer when it begins to heal—it might begin with irregular borders, then it can become more circular.

A deep ulcer is not always painful; it is not always collapsed, nor does it always lose pressure. A cobalt-blue filter with an ultraviolet light helps detect less obvious corneal abrasions, especially when using a full-strength, wetted fluorescein strip, said Brooks.

A fungal ulcer can initially look like an abrasion and stain only faintly.

To determine whether aqueous humor is leaking from deeper tissues of the eye due to corneal penetration, it is useful to use a regional nerve block to eliminate the blink, followed with topical anesthetic. Brooks recommended painting fluorescein on the cornea, then waiting and watching. A change in color occurs with leaked aqueous humor, which also happens to be toxic to the conjunctiva. This Seidel's test also helps with suture repair to check whether sutures penetrate too deeply and cause a leak. The Seidel's test can result in a false negative if intraocular pressure is too



Dr. Dennis Brooks and one of his successful patients, Barney the Clydesdale

low; however, in that case, fluorescein might migrate inward into the anterior chamber and turn green inside the eye.

Use of Rose-Bengal stain evaluates stability and integrity of the tear film. Normally, the tear film breaks up in 10–15 seconds, but rapid dissipation indicates roughening on the corneal surface that doesn't allow the tear film to hold together. Dry eye is one cause of a roughened corneal surface and can occur with viral or fungal diseases.

A corneal scraping is useful to detect bacteria or fungal hyphae. Brooks recommended a deep corneal scraping at the edge of the ulcer rather than a superficial swab that primarily obtains debris. He suggested debridement of an ulcer with irregular edges by using the handle of a scalpel blade or cytology brush to scrape with topical anesthesia on board. He noted that topical anesthetic is toxic to corneal epithelium, so veterinarians should restrict topical anesthetics for use in diagnostics and for

debridement. Anesthetic takes maximum effect within five minutes and lasts up to 25 minutes.

Results from a bacterial culture, sensitivity and cytology inform decisions about implementation of aggressive treatment with topical antibiotics and possibly anti-fungal agents. Removal of necrotic debris surrounding the margins of an ulcer facilitates epithelium to cover the defect. Corneal edema is managed with hyperosmotic topical 5% sodium chloride drops or ointment.

Healing of a Corneal Defect

A mucin layer from goblet cells enables attachment of the tear film to the corneal surface to make it optically smooth. Normal tear fluid contains soluble proteases essential to corneal health. Excessive amounts of proteases produced by inflammatory cells lead to pathologic degradation.

White blood cells originate from vessels in the lids and cornea so don't need



Here Dr. Dennis Brooks uses a smartphone during a horse eye exam.

to migrate; hence, they are the first to arrive with tissue destruction or infection, invading the cornea at 8.6 mm/day. Brooks stresses that even after treatment kills bacteria, white blood cells (neutrophils) die and release enzymes (proteases) into the tear film to worsen an ulcer. One objective in treatment is to return tear film protease levels back to normal.

Following an injury, mitosis (cell division) stops, and the cells at the edge of the wound enlarge and lose their attachment, allowing them to slide over the defect. This forms a single layer of cells that eventually covers the corneal wound with a multi-layered sheet of cells. Corneal epithelial cells migrate at a rate of 0.6–1.2 mm/day if there is no concurrent infection. It takes at least six weeks for the epithelium to securely attach once it has crossed the defect.

Blood vessel migration moves from the periphery at 1 mm/day but might be slowed by nonsteroidal anti-inflammatory medication (NSAID) use. An indolent ulcer is one that won't heal either due to an abnormality of the basement membrane or a problem of adherence.

A defect in the stroma results in resorption and remodeling, which takes longer than healing of more superficial ulcers. Any imbalance in this restorative



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Staining the eye with flourescein dye reveals defects in the corneal epithelium and reveals the extent of an ulcer.

process can lead to “melting” of the cornea due to up-regulation of enzymes of bacteria or white blood cells—the cleanup process exceeds the rate of repair. A melting ulcer is not always due to bacterial influences and is a true emergency; there is the possibility of prolapsing of internal eye tissues within hours or days.

Treatment to Mitigate Pathology

Enzymes are responsible for collagen destruction by proteases, so medications that inhibit destructive enzymes are critical for success.

Equine serum reduces enzymes by 90%, while 0.2% EDTA slows proteolytic activity by 99.4%. (An EDTA solution can be made by filling a purple top tube half-way with sterile water.) Serum and plasma also work to decrease neutrophils, which are the biggest problem for the equine cornea even after treatment kills microorganisms. EDTA should not be mixed with serum or plasma treatment.

Plasma has an additional benefit of containing fibrinogen and fibronectin, which are important components to facilitate attachment of migrating epithelial cells. Healing starts at the limbus,

where there are plentiful stem cells. Brooks described the circular pattern that leads to ulcer healing as “epithelial cells whirl[ing] in from the limbal conjunctiva rather than coming in straight.”

To encourage collagen cross-linking of an injured cornea, Brooks recommended treatment with vitamin B2 (riboflavin) and ultraviolet light. UV light helps to increase collagen fiber diameter and corneal strength, and it decreases microbial properties. Riboflavin-phosphate 0.25% (two to three drops every six minutes for 20 minutes) enhances ultraviolet light absorption. UV irradiation at wavelength 365 nm is directed at the cornea at 3 cm distance for 15 minutes. The veterinarian should wear ultraviolet eye protection.

Brooks warned that every corneal ulcer has some degree of uveitis. NSAIDs quiet the uveitis and lessen pain. Systemic flunixin meglumine or firocoxib and/or topical atropine help to treat inflammation at the back of the eye and provide pain relief.

Dilation of the pupil deters internal damage and is achieved with atropine that exerts several favorable effects on the eye. It dilates the pupil to decrease risk of synechia; it strengthens iris capillaries and decreases leakage; and it

decreases ciliary muscle spasms to mitigate pain. Just one drop of 1% atropine will dilate a pupil for up to two weeks; multiple doses of atropine applied over a few days can lead to problems with intestinal motility and colic. Topical 1% morphine applied every four hours also helps to reduce pain with no effect on wound healing.

Topical corticosteroids should *never* be used in an ulcerated eye, although in some cases systemic corticosteroids might have a beneficial role in combating inflammation.

The objective in treatment of corneal ulcers is to stop corneal melting, restore drainage, sterilize the wound, provide structural support for ulcer repair, decrease pain and inflammation, and prevent secondary damage to the interior of the eye. Treatment is usually necessary at least four times a day. Surgery and placement of a sub-palpebral lavage tube might facilitate treatment and healing.

Take-Home Message

In summary, Brooks described appropriate steps to manage corneal ulcers as follows:

- Sterilize the ulcer surface as soon as possible using antimicrobial topical drugs.
- Inhibit tear film protease activity with serum, plasma or EDTA.
- Decrease corneal edema with 5% sodium chloride to mitigate edema interference with adhesion of epithelial cells to the stroma and edema’s role in slowing migration of epithelial cells across the surface.
- Minimize uveitis with NSAIDs and/or atropine—as an ulcer heals, uveitis should resolve, and pain will diminish.
- Moderate corneal fibrosis to decrease the scar.

Replace missing collagen of missing corneal tissue using collagen shields or amniotic membrane or strengthen collagen cross-links with riboflavin and ultraviolet light treatment. **EM**



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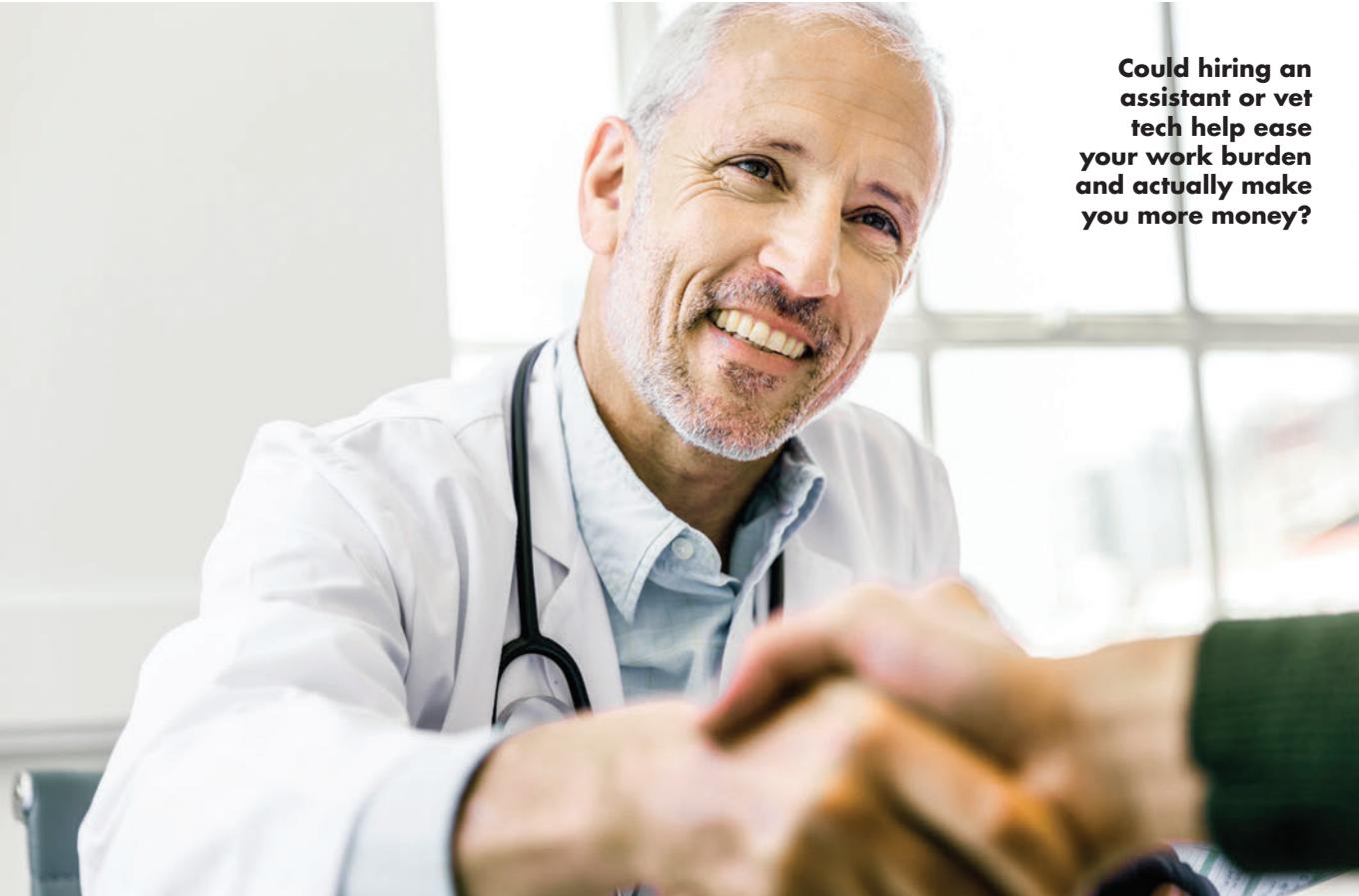


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Hiring Your First Staff Member

Learn the steps to assessing, getting ready to hire and hiring an employee in your veterinary practice.

By Amy L. Grice, VMD, MBA

The 2016 AVMA AAEP Equine Economic Study revealed that 16% of practices had no employees. A more recent study conducted by this author for EquiManagement in November 2021 had similar results, with 17% of the 312 respondents reporting that the practice where they worked had no other employees. Many of these practices are undoubtedly solo practices, with the veterinarian performing all

tasks necessary to provide services.

Reasons vary for not having any staff to help with tasks that do not require a veterinary degree. Some doctors explained that they cherish their freedom to make “on-the-fly” decisions about their schedules without worrying about the time considerations of an employee. Others fear they will lose precious time alone in the truck. Some feel they will not be able to afford the wages, or they fear the responsibility of having someone

depending on them for a living. For a few, the hassle of payroll tax obligations, workers’ compensation insurance and managing an employee just seem like too much trouble. However, there are very good reasons to consider hiring help.

Often the best first employee for a practice to add is an ambulatory assistant. An assistant can increase the safety of the veterinarian by more effectively restraining patients and thereby decreasing the risk of injuries. Equipment is

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There are ways to afford a full- or part-time assistant to make your days safer and lighten your load.

often better maintained by an employee than by an exhausted and overwhelmed veterinarian. Assistants can drive, allowing the veterinarians to write invoices or medical records during travel between calls, as well as make client callbacks. Alternatively, if the veterinarian prefers to drive, a well-trained ambulatory team member can do these tasks.

Assistants also allow patients to be seen when clients are at work, increasing customer satisfaction and often improving efficiency. Having a second set of eyes on invoices can prevent most missed charges for services and dispensed items. This increases revenue and profit for the practice, as well as decreasing stress for the veterinarians. Assistants allow doctors to stick to doing “doctor things” while they take responsibility for keeping the truck stocked, laboratory submissions prepared and equipment maintained.

You might be wondering whether you

can afford to hire an assistant. It is important to know that benefits, overtime, payroll taxes and workers’ compensation will typically increase the hourly wage by 50%-100%. A \$15/hour wage really costs the practice \$22.50 to \$30 per hour. If we assume minimal benefits, at \$22.50/hour for five 10-hour days per week, that assistant could cost the practice \$1,125 per week for 52 weeks, or \$58,500. To afford that assistant, the practice needs an additional \$58,500 in profit, or the owner needs to be financially able to take less in distributions. If taking home less money is not possible for the owner, then increased revenue will be needed. If the practice is making 20% profit, that’s up to an additional \$292,500 in revenue to afford the assistant’s costs.

Ways To Afford an Assistant

Before giving up on the idea of an assistant as unaffordable, remember that

the increased efficiency that assistants bring to the practice will allow the doctor to have a higher percentage of billable hours in each working day, so revenue will naturally rise. In addition, not having several hours of administrative tasks at the end of the workday will mean that the veterinarian starts each day better rested and able to tackle a new set of diagnostic challenges with more enthusiasm.

Hiring a part-time assistant to minimize benefits and eliminate overtime might be the best approach to start. At \$15/hour for 20 hours/week (\$300) plus 9% payroll taxes (\$27) for 52 weeks and \$200 in workers’ compensation costs, the assistant then costs just \$17,204 per year. At 20% profit, only \$86,020 in additional revenue is required if the owner cannot afford to take less of a distribution. This seems doable to most veterinarians, and typically what they find is that their lives are vastly improved,

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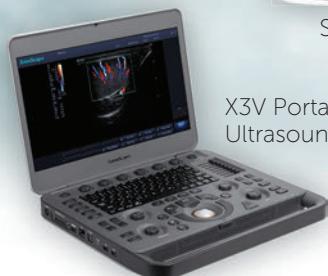
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Burnout and compassion fatigue are real for equine vets; look for solutions sooner rather than later.

along with their efficiency and revenue production.

With someone else to set up and pack up the DR and/or ultrasound, suddenly the doctor is much more eager to offer those services even when pressed for time or at the end of a long day. Patient care and customer service typically improve.

With two extra hands, the work of the day is lightened considerably. Simply having the companionship of another team member can brighten the mood. Consider raising your prices 10% in order to fund an assistant's wages—you deserve the help!

“Being too busy” is a reason to consider hiring, but the business owner must create a job description and have repetitive daily and weekly tasks that can be delegated to an employee. In the ambulatory setting, this generally isn't difficult! Here is a resource for hiring: <https://www.sba.gov/business-guide/manage-your-business/hire-manage-employees>.

Get Ready To Hire

Before hiring that first employee, take these steps:

Step 1: List your employee's tasks in a job description.

Step 2: Standardize the work this employee will do; create policies and procedures.

Step 3: Document procedures in writing, videos or podcasts (or have your new employee help you produce these as you train that person).

Step 4: Figure out the financials—can you afford to pay this new employee?

Step 5: Advertise the position and interview candidates.

Step 6: Make the hire.

Step 7: Plan the new employee's first two weeks of orientation and training.

You must follow tax and legal requirements before hiring and retaining employees. Be sure that your business is compliant with state, local and federal regulations by doing the following tasks:

1. *Get an Employer Identification Number (EIN)*

An EIN is a nine-digit number assigned by the IRS that identifies you as a business entity and allows you to legally hire employees. Start by visiting the IRS website, since the IRS encourages companies to apply for employer ID numbers online.

2. Verify Employee Work Eligibility

Although you don't have to submit this form to the federal government, U.S. Citizenship and Immigration Services (USCIS) requires that all employers verify an individual's eligibility to work in the United States by completing IRS Form I-9. The last page of Form I-9 specifies the documentation new hires must present to employers to attest to their employment authorization, whether they are citizens or non-citizens. Use I-9 Central at <https://www.uscis.gov/i-9-central> if you need assistance with electronically verifying employees' identity and employment authorization.

3. Satisfy Federal and State Tax Reporting and Wage Requirements

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It's a concentrate, so you can adjust its performance to what you need. You can use it full strength, but 63% of users reporting said diluted, it worked fine. After you use up your first quart spray bottle, don't throw it away, instead refill it from our 3 quart pouch. Doing that and diluted by 50%, your cost per quart is only \$9.98 delivered. *Not recommended for use on white or grey hair due to yellowing.* More Bye Bye Insects info: spalding-labs.com/chubb



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regulations, you must properly classify your workers as employees or independent contractors. Because of the strict rules regarding independent contractors, it is unlikely any of your employees will qualify. Whether you decide to hire employees, contractors or both, your decision will determine the amount of unemployment and payroll taxes you pay. If you hire an independent contractor, freelancer or consultant, the individual will be responsible for reporting and paying his or her own Social Security, Medicare and income taxes. You'll need to file a Form 1099 for any independent contractors you hire.

Assistants cannot be paid a salary in an attempt to avoid overtime. The Department of Labor Fact Sheet No. 170 states: "Technologists and technicians, such as engineering technicians, ultrasound technologists, licensed veterinary technicians, avionics technicians and other similar employees, are not exempt under Section 13(a)(1) from the minimum wage and overtime requirements of the FLSA because they generally do not meet the requirements for the learned professional exemption. Technologists and technicians do not meet these requirements for the learned professional exemption because they do not work in occupations that have attained recognized professional status, which requires that an advanced, specialized academic degree is a standard prerequisite for entrance into the profession." (See https://www.dol.gov/whd/overtime/fs170_technicians.pdf.)

If you decide to hire either part-time and/or full-time employees, each employee must fill out IRS Form W-4, Employee's Withholding Allowance Certificate, to indicate the number of allowances he or she is claiming for tax purposes. As an employer, you're responsible for withholding certain taxes—based on the number of allowances the employee claims on his or her Form W-4—from your employee's

paycheck. These include federal income, Social Security and Medicare taxes, as well as Federal Unemployment Taxes. You might also be required to withhold state and local income taxes, depending on your state's laws. As an employer, you're also responsible for reporting the amount of wages paid and taxes withheld for each employee using a Form W-2. Many employers choose to use a payroll service to do this important work.

4. Report New Hires to Your State Directory

Federal law requires that all employers report new employees to their state's directory within 20 days after the date of hire. See the Small Business Administration's website (www.sba.gov) for a list of New Hire Reporting Centers in each state.

5. Obtain Workers' Compensation Insurance

As an employer, you are required to obtain workers' compensation insurance (www.dol.gov/topic/workcomp/) for employees who might get injured on the job. Workers' compensation laws across states differ slightly in details, such as benefit rates and the procedural rules governing employers, employees and insurance firms.

6. Post Required Notices on Worker Rights

With the exception of Texas, every U.S. state requires most employers to display up-to-date posters highlighting federal and state workers' rights in a conspicuous area in the workplace. These workers' rights are constantly evolving, meaning the posters need to be updated regularly.

The Hiring Process

Once you have received several applications that are favorable, you will interview the candidates you feel are qualified for the position. Interview questions should be uniform for all applicants in each interviewing cycle. Make notes

about each applicant and keep those records for all applicants, not just those you hire. Make sure your notes do not include descriptions of appearance.

Interview questions are best when they are open-ended rather than eliciting "Yes" or "No" responses. Some suggested questions/requests are: "What are your greatest strengths?" "What are your greatest weaknesses?" "What is the reason you have applied for a position at ABC Equine?" and "Give me an example of a time you have handled a conflict in the workplace."

References should always be called. *Do not skip this step.* Confirm the dates of employment and the wage, if possible. Ask "Would you employ this individual again, if given the opportunity?" and "Is there anything else you would like to tell me about the applicant?"

Orientation

After you choose your new staff member, make sure to introduce him or her to your software, billing, pharmacy and equipment use. Introduce your new hire to as many clients as possible over the first few weeks, perhaps by making a website, Facebook or Instagram post to welcome that person to your practice. Make sure you are always available to answer questions or address concerns. Go over your employee manual with your new hire to ensure that your policies are understood. Make sure that person receives mandated controlled substance and safety training in the first week of employment. You should have written acknowledgements in the new hire's personnel file of receipt and understanding of all three of these aspects of their responsibilities.

Take-Home Message

Many contributions can be made by an employee in a small vet practice. Increased revenue and profit often follow staff additions as doctors are freed from tasks that decrease their efficiency. **EM**

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Amanda Compton talks about equine dentistry and vet techs.

A Focus on Equine Dentistry

This column will be dedicated each issue to topics relating to vet techs and assistants.

By Amanda Compton, EDT/LVT/RVT, AAETV vice president

As a young horse owner, I recall reading articles in *Horse Care* magazine that suggested having a horse's teeth examined if they were over the age of 15, losing weight or dropping feed when eating. I had a 10-year-old Arabian gelding that was a hard keeper, so my veterinarian suggested we float his teeth. In a parking lot, with no speculum, he used a hand-held rasp to file the enamel edges on the teeth of my unsedated horse. The procedure cost \$25 and didn't solve the problem.

When I was first introduced to equine dentistry over 25 years ago, that method was the norm. The science behind functional dental occlusion (contact) and dental pathology was not widely applied in practice, and most horse owners resorted to "lay dentists."

I developed an interest in equine dentistry, working with the limited

number of veterinarians (and some non-vets) who had the passion, experience and education in the subject. I earned my veterinary technology degree and attended equine dentistry conferences in the US, the UK and Europe, as well as working in the Middle East to further my education and skills.

Today's practice of equine dentistry is more involved than that first floating experience might have led me to believe. The standards of care have shifted away from antiquated methods and equipment. Owners have become more proactive in their horses' dental health.

Personally, I believe equine dentistry is an aspect of veterinary medicine that should be performed by licensed professionals with specific training. Lesley Parisi, DVM, said, "The benefits of having a competent, understanding and intellectual professional to coordinate equine dental care are invaluable to our practice.

We do not have the time in a general mixed animal practice to dedicate to staying current with the ever-changing equine dental industry; however, our patients deserve the very best."

Increasingly, practitioners and horse owners recognize the *necessity* for sedation/analgesia and they realize the efficiency and value of motorized equipment over simple rasps. Evaluation of a horse's dentition and the use of safer, more precise execution of dental procedures require a modern approach to equine dentistry.

Early in my career, I realized the importance of teaming with veterinarians to provide the best possible dental care. As an LVT, I am adept in performing patient physicals, recognizing abnormalities, monitoring anesthesia/sedation and conveying any concerns I have with the presiding veterinarian. We communicate openly in order to take into consideration any medical issues the patient might have. We can combine our knowledge for the best interest of the horse and the owner.

A veterinarian I routinely work with commented, "Amanda has been performing dentistry for me for several years. Our typical routine starts with my performing a brief physical examination of the horse and administering sedation. Amanda is great about talking through a tour of the mouth with the owners, and they love seeing and learning from her! When she finds any abnormalities, she discusses them with me, allowing me to determine the best course of action with the horse's owner.

"Her skill and knowledge as both an equine dental technician as well as a licensed veterinary technician is most appreciated. We are both involved and invested in providing the best dental care for my clients' horses!"—Dr. Maureen Kelleher, DVM, CVA, DACVS. **EM**

Amanda Compton, EDT/LVT/RVT, is a Virginia Board of Veterinary Medicine-licensed veterinary technician and a registered equine dental technician.



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Self-compassion encompasses common humanity, mindfulness and self-kindness.

Self-Compassion: A Critical Shift in Engaging with Ourselves

When considering how to incorporate self-compassion into your daily life, there are key areas that provide significant rewards.

By Colleen Best, DVM, PhD, CCFP

The simplicity of the term “self-compassion” defies the complexity of its practice, the benefits it affords and the courage it can require.

Breaking it down to the words involved, “compassion” is a sensitivity to or awareness of the suffering of others and a desire to ameliorate it.^{1,2} When we place the word “self” in front of it, we shift our focus from others and place it on ourselves and our own experiences.

Self-compassion is the combination of three different practices: common humanity, mindfulness and self-kindness. Self-compassion originates from the insight tradition of Buddhism.³ In order to understand and appreciate the value

of self-compassion, it’s critical to explore the three components listed above.

Common Humanity

Common humanity is the knowledge that everyone makes mistakes and that imperfection is something that all people have in common.⁵ This knowledge can help debunk the isolation that can accompany a mistake or disappointment in one’s performance or experiences.⁵ This idea can seem relatively straightforward to embrace, at least on its surface. That said, it’s worth pausing to consider the many implications of this idea.

Perfectionism is something with which many struggle, and one aspect that we find difficult is that we are

unworthy if we are imperfect. This is an isolating belief, one that serves to amplify and maintain the difference between us and others. Brene Brown shared an insightful and powerful thought on this subject: “You are imperfect; you are wired for struggle but you are worthy of love and belonging.”

Common humanity is an invitation to keep in mind that our struggles are not our own fault. They are not due to shortcomings or inadequacies of ourselves as humans; they are simply part of the experience of being human.

Mindfulness

“Between stimulus and response, there is a space. In that space lies our freedom and

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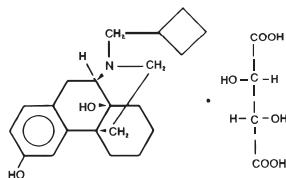
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Chemical Structure:



Each mL of Butorphic Injection contains butorphanol base (as butorphanol tartrate, USP) 10 mg, 3.3 mg citric acid, USP, 6.4 mg sodium citrate, USP, 4.7 mg sodium chloride, USP, and 0.1 mg benzethonium chloride, USP, q.s. with water for injection, USP.

CLINICAL PHARMACOLOGY

Comparative Pharmacology

In animals, butorphanol has been demonstrated to be 4 to 30 times more potent than morphine and pentazocine (Talwin®-V) respectively.¹ In humans, butorphanol has been shown to have 5 to 7 times the analgesic activity of morphine and 20 times that of pentazocine.^{2,3} Butorphanol has 15 to 20 times the oral antitussive activity of codeine or dextromethorphan in dogs and guinea pigs.⁴

As an antagonist, butorphanol is approximately equivalent to nalorphine and 30 times more potent than pentazocine.¹

Cardiopulmonary depressant effects are minimal after treatment with butorphanol as demonstrated in dogs,⁵ humans^{6,7} and horses.⁸ Unlike classical narcotic agonist analgesics which are associated with decreases in blood pressure, reduction in heart rate, and concomitant release of histamine, butorphanol does not cause histamine release.¹ Furthermore, the cardiopulmonary effects of butorphanol are not distinctly dosage related but rather reach a ceiling effect beyond which further dosage increases result in relatively lesser effects.

Reproduction: Studies performed in mice and rabbits revealed no evidence of impaired fertility or harm to the fetus due to butorphanol tartrate. In the female rat, parenteral administration was associated with increased nervousness and decreased care for the newborn, resulting in a decreased survival rate of the newborn. This nervousness was seen only in the rat species.

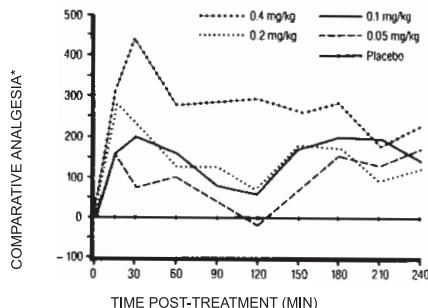
Equine Pharmacology

Following intravenous injection in horses, butorphanol is largely eliminated from the blood within 3 to 4 hours. The drug is extensively metabolized in the liver and excreted in the urine.

In ponies, butorphanol given intramuscularly at a dosage of 0.22 mg/kg was shown to alleviate experimentally induced visceral pain for about 4 hours.⁹

In horses, intravenous dosages of butorphanol ranging from 0.05 to 0.4 mg/kg were shown to be effective in alleviating visceral and superficial pain for at least four hours, as illustrated in the following figure:

Analgesic Effects of Butorphanol Given at Various Dosages in Horses with Abdominal Pain



*Pain threshold in butorphanol-treated colicky horses relative to placebo controls

A definite dosage-response relationship was detected in that butorphanol dosage of 0.1 mg/kg was more effective than 0.05 mg/kg but not different from 0.2 mg/kg in alleviating deep abdominal pain.

Acute Equine Studies

Rapid intravenous administration of butorphanol at a dosage of 2.0 mg/kg (20 times the recommended dosage) to a previously unmedicated horse resulted in a brief episode of inability to stand, muscle fasciculation, a convulsive seizure of 6 seconds duration, and recovery within three minutes. The same dosage administered after 10 successive daily 1.0 mg/kg dosages of butorphanol resulted only in transient sedative effects. During the 10 day course of administration at 1.0 mg/kg (10 times the recommended use level) in two horses, the only detectable drug effects were transient behavioral changes typical of narcotic agonist activity. These included muscle fasciculation about the head and neck, dysphoria, lateral nystagmus, ataxia, and salivation. Repeated administration of butorphanol at 1.0 mg/kg (10 times the recommended dose) every four hours for 48 hours caused constipation in one of two horses.

Subacute Equine Studies

Horses were found to tolerate butorphanol given intravenously at dosages of 0.1, 0.3, and 0.5 mg/kg every 4 hours for 48 hours followed by once daily injections for a total of 21 days. The only detectable drug effects were slight transient ataxia observed occasionally in the high dosage group. No clinical, laboratory, or gross or histopathologic evidence of any butorphanol-related toxicity was encountered in the horses.

INDICATIONS

Butorphic (butorphanol tartrate) Injection is indicated for the relief of pain associated with colic in adult horses and yearlings. Clinical studies in the horse have shown that butorphanol tartrate alleviates abdominal pain, associated with torsion, impaction, intussusception, spasmodic and tympanic colic, and postpartum pain.

WARNINGS

DO NOT USE IN HORSES INTENDED FOR HUMAN CONSUMPTION.

CAUTION

Butorphic Injection, a potent analgesic, should be used with caution with other sedative or analgesic drugs as these are likely to produce additive effects.

There are no well-controlled studies using butorphanol in breeding horses, weanlings, and foals. Therefore, the drug should not be used in these groups.

ADVERSE REACTIONS

In clinical trials in horses, the most commonly observed side effect was slight ataxia which lasted 3 to 10 minutes. Marked ataxia was reported in 1.5% of the 327 horses treated. Mild sedation was reported in 9% of the horses.

DOSAGE

The recommended dosage in the horse is 0.1 mg of butorphanol per kilogram of body weight (0.05 mg/lb) by intravenous injection. This is equivalent to 5 mL of Butorphic Injection for each 1000 lbs body weight. The dose may be repeated within 3 to 4 hours but treatment should not exceed 48 hours. Pre-clinical model studies and clinical field trials in horses demonstrate that the analgesic effects of butorphanol tartrate are seen within 15 minutes following injection and persist for about 4 hours.

HOW SUPPLIED

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

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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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Self-kindness is when you treat yourself the same way you would treat a good friend.

our power to choose our response. In our response lies our growth and our happiness.” (commonly misattributed to Victor Frankl; source unknown)

It’s important to understand the “technical” definition of mindfulness, not just what has become a buzzword meaning “aware.” Mindfulness involves having an awareness of what is occurring (e.g., events, emotions, thoughts) in the present

moment, while refraining from assessment or judgment of the experience.⁵

Having an awareness of what is happening sounds simple, but it’s not easy.

There are often multiple things competing for our attention at any given time, whether it be our phones, smartwatches, email, children, clients and so on. We are often juggling these demands, which can result in not being fully present for any of them. Changing this default state of being toward one where—at least sometimes—we are fully present and engaged in what is happening is a powerful and difficult shift to make. Shifting toward being present also allows us to recognize the space between stimulus and response, ensuring that we are responding, not just reacting.

Adopting a nonjudgmental stance can also be challenging. As a society, we’ve become accustomed to labeling many people, experiences, emotions and things as “good” or “bad” instead of just noticing and accepting. The idea “don’t believe everything you think” can be quite helpful as we work toward practicing mindfulness.

On a daily basis, many things float through our minds at random and in response to stimuli. Not all of them are meaningful or true. Meditation, for example, is one way to practice mindfulness. Mindfulness is a necessary component of self-compassion because we need to recognize when there are situations in which practicing self-compassion would be of benefit.⁵

Self-Kindness

Self-kindness is best considered to be treating oneself the same way you would treat a good friend. Think about the last conversation you had with yourself after you had a mistake—would you have said those same things to a friend?

Self-kindness involves changing the way we treat ourselves and adopting an attitude of support, warmth and acceptance.⁶ It also involves identifying what steps are needed to stand tall and be grounded in one’s own beliefs and truth. From there you can go forward and fight for what you want, need and deserve. This might include setting and asserting boundaries, being steadfast in our beliefs and living our values.

There is a dichotomy to self-compassion; it has two seemingly opposite arms that come together to create a powerful whole, with each balancing and lifting the other up.⁶ Admittedly, that might seem a little abstract, so let’s consider the genius that is a peanut butter and jelly sandwich.

The peanut butter and the jelly have little in common, yet each contributes something essential to the sandwich, creating an overall product that is more nutritious (and delicious) than either alone. The jelly is the “comforting, soothing and validating”⁶ arm, while the peanut butter is the arm that centers around “protecting, providing and motivating”⁶ ourselves.

Awareness of these two complementary ways self-compassion can act is critical to understanding its value proposition. Further, appreciating the dichotomy busts many of the common barriers or criticisms of self-compassion—namely that it is weak, selfish and/or akin to self-pity. Nothing could be further from the truth.

It takes great courage to be present with our struggles and to act to ameliorate them, whether that be through the peanut butter arm (action), the jelly arm (being with ourselves), or both.

Research has shown that individuals who demonstrate self-compassion

SAFETY: Xylazine has been tested in horses at 5 times the recommended dose, and at doses above the recommended range in Cervidae. However, doses of this magnitude may produce convulsions and long periods of sedation in horses and muscle tremors and long periods of sedation in Cervidae.

STORAGE:

Protect from heat. Do not store over 30° C (86° F).

HOW SUPPLIED:

NDC 59399-111-50 50 mL vial

NADA # 139-236, Approved by FDA

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Manufactured by: **Akorn, Inc.**
Lake Forest, IL 60045

XYA0N Rev. 02/20

U.S. Pat. No. 4,614,798

JA024 Rev 02/2022

AnaSed® Injection

(xylazine injection)

100 mg/mL

Sedative and Analgesic for Use in Horses
and Cervidae (Fallow Deer, Mule Deer,
Sika Deer, White-Tailed Deer and Elk)

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

Do not use in Cervidae less than 15 days before or during the hunting season.

DESCRIPTION: AnaSed® is supplied in 50 mL multiple-dose vials as a sterile solution.

EACH mL CONTAINS: Xylazine hydrochloride equivalent to 100 mg of base activity, methylparaben 0.9 mg, propylparaben 0.1 mg, sodium citrate dihydrate 5.0 mg and water for injection, pH adjusted with citric acid and sodium citrate.

INDICATIONS: Xylazine should be used in horses and Cervidae (Fallow Deer, Mule Deer, Sika Deer, White-Tailed Deer and Elk) when it is desirable to produce a state of sedation accompanied by a shorter period of analgesia.

Horses: Xylazine has been used successfully as follows:

1. Diagnostic procedures — oral and ophthalmic examinations, abdominal palpation, rectal palpation, vaginal examination, catheterization of the bladder and radiographic examinations.
2. Orthopedic procedures, such as application of casting materials and splints.
3. Dental procedures.
4. Minor surgical procedures of short duration such as debridement, removal of cutaneous neoplasms and suturing of lacerations.
5. To calm and facilitate handling of fractious animals.
Major surgical procedures:
 - a. When used as a preanesthetic to general anesthesia.
 - b. When used in conjunction with local anesthetics.

Cervidae: Xylazine may be used for the following:

1. To calm and facilitate handling of fractious animals.
2. Diagnostic procedures.
3. Minor surgical procedures.
4. Therapeutic medication for sedation and relief of pain following injury or surgery.
5. As a preanesthetic to local anesthesia, AnaSed at the recommended dosages can be used in conjunction with local anesthetics, such as procaine or lidocaine.

DOSAGE AND ADMINISTRATION:

1. Dosage

Horses:

Intravenous — 0.5 mL/100 lb body weight (0.5 mg/lb or 1.1 mg/kg).

Intramuscular — 1.0 mL/100 lb body weight (1 mg/lb or 2.2 mg/kg).

Cervidae:

Administer intramuscularly, by either hand syringe or syringe dart, in the heavy muscles of the croup or shoulder.

Fallow Deer (*Dama dama*) — 2.0 to 4.0 mL/100 lbs body weight (2.0 to 4.0 mg/lb or 4.4 to 8.8 mg/kg).

Mule Deer (*Odocoileus hemionus*) — 1.0 to 2.0 mL/100 lbs body weight (1.0 to 2.0 mg/lb or 2.2 to 4.4 mg/kg).

Sika Deer (*Cervus nippon*) — 1.0 to 2.0 mL/100 lbs body weight (1.0 to 2.0 mg/lb or 2.2 to 4.4 mg/kg).

White-Tailed Deer (*Odocoileus virginianus*) — 1.0 to 2.0 mL/100 lbs body weight (1.0 to 2.0 mg/lb or 2.2 to 4.4 mg/kg).

Elk (*Cervus canadensis*) — 0.25 to 0.5 mL/100 lbs body weight (0.25 to 0.5 mg/lb or 0.55 to 1.1 mg/kg).

Following injection of xylazine, the animal should be allowed to rest quietly until the full effect has been reached.

These dosages produce sedation which is usually maintained for 1 to 2 hours, and analgesia which lasts for 15 to 30 minutes

2. Preanesthetic to Local Anesthesia

Xylazine at the recommended dosages can be used in conjunction with local anesthetics, such as procaine or lidocaine.

3. Preanesthetic to General Anesthesia

Xylazine at the recommended dosage rates produces an additive effect to central nervous system depressants such as pentobarbital sodium, thiopental sodium and thiamylal sodium. Therefore, the dosage of such compounds should be reduced and administered to the desired effect. In general, only 1/3 to 1/2 of the calculated dosage of the barbiturates will be needed to produce a surgical plane of anesthesia. Post-anesthetic or emergence excitement has not been observed in animals preanesthetized with xylazine.

Xylazine has been used successfully as a preanesthetic agent for pentobarbital sodium, thiopental sodium, thiamylal sodium, nitrous oxide, ether, halothane, glyceryl guaicolate and methoxyflurane anesthesia.

WARNING: This drug should not be administered to domestic food-producing animals.

Do not use in horses intended for human consumption.

Avoid accidental administration to humans. Should such exposure occur, notify a physician immediately. Artificial respiration may be indicated.

In Cervidae, occasional capture-associated deaths occur. Clinical trials reveal a mortality rate of approximately 3.5% attendant with the administration of xylazine.

PRECAUTIONS: Careful consideration should be given before administering to horses and Cervidae with significantly depressed respiration, severe pathologic heart disease, advanced liver or kidney disease, severe endotoxic or traumatic shock and stress conditions such as extreme heat, cold, high altitude or fatigue.

Do not use xylazine in conjunction with tranquilizers.

Analgesic effect is variable, and depth should be carefully assayed prior to surgical/clinical procedures. Variability of analgesia occurs most frequently at the distal extremities of horses and Cervidae. **In spite of sedation, the practitioner and handlers should proceed with caution since defense reactions may not be diminished.**

Intracarotid Arterial Injection Should Be Avoided.

As with many compounds, including tranquilizers, immediate violent seizures followed by collapse may result from inadvertent administration into the carotid artery. Although the reaction with xylazine is usually transient and recovery may be rapid and complete, special care should be taken to assure that the needle is in the jugular vein rather than the carotid artery.

Horses: Since an additive effect results from the use of xylazine and the barbiturate compounds, it should be used with caution with these central nervous system depressants. Products known to produce respiratory depression or apnea, such as thiamylal sodium should be given at a reduced dosage and when injected intravenously, should be administered slowly. When intravenous administration is desired, avoid perivascular injection in order to achieve the desired effect. Studies have shown negligible evidence of tissue irritation, however, following perivascular injection of xylazine.

Bradycardia and an arrhythmia in the form of incomplete atrioventricular block have been reported following xylazine administration. Although clinically the importance of this effect is questioned,^{1,2,3,4} a standard dose of atropine given prior to or following xylazine will greatly decrease the incidence.

Sedation for transport is most successful if actual transportation is begun after the full effect of the drug has been reached and the animal's stability is maintained while standing. In addition, it should be noted that animals under the influence of xylazine can be aroused by noise or other stimuli and this may increase the risk of injury.

Cervidae: It is preferable to administer AnaSed® to fasted Cervidae. As in all ruminants a safeguard against aspiration of food material into the lungs and/or bloat during deep sedation is necessary.

Care should be taken to administer AnaSed® in the heavy muscles of the croup or shoulder. Injections given subcutaneously, intraperitoneally or into fat deposits will give unpredictable results.

Cervidae should not be disturbed during induction or until the full effect of the drug has been reached which is usually 10 to 15 minutes following injection. The usual time to initial effect of the drug is 2 to 5 minutes. The administrator of the drug should be fully cognizant of this interval prior to administration of drug to free-ranging deer or elk, especially at night or in heavily wooded areas.

If the animal has been underdosed (faulty injection or miscalculation on weight) it is advisable to wait one hour before administering a second dose.

Adequate ventilation — especially in cages or crates is mandatory; keep head and neck in position to insure patent air passage and to prevent aspiration of stomach contents.

During sedation Cervidae should be prevented from assuming lateral recumbency. A sternal recumbent position is desirable.

While under the effects of xylazine, the animal should be protected from an extremely hot or cold environment.

Efforts should be made to prevent patient from rising until almost complete recovery is attained.

The transportation of Cervidae given AnaSed® should be carefully monitored to prevent excessive struggling, injury or death.

Hyperthermic reactions may occur, especially if the subject is in a highly excited psychic state when the drug is administered. Hosing the head and entire body with cold water has usually proven to be an effective deterrent.

Data are presently inadequate to recommend AnaSed®'s use in pregnant Cervidae. Avoid use during breeding season.

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

Care should be taken at all times when administering AnaSed® to Cervidae. This is due to the method of administration (usually darting), the difficulty in estimating body weights and the accepted theory that wild animals are more unpredictable in their response to sedatives and analgesics than the domesticated species.

ADVERSE REACTIONS: Xylazine in horses and Cervidae used at recommended dosage levels may occasionally cause slight muscle tremors, bradycardia with partial A-V heart block and a reduced respiratory rate. Movement in response to sharp auditory stimuli may be observed. In horses, sweating, rarely profuse, has been reported following administration. In Cervidae, salivation, various vocalizations (bellowing, bleating, groaning, grunting, snoring) on expiration, audible grinding of molar teeth, protruding tongue and elevated temperatures have also been noted in some cases.

PHARMACOLOGY: Xylazine, a non-narcotic compound, is a sedative and analgesic as well as a muscle relaxant. Its sedative and analgesic activity is related to central nervous system depression. Its muscle-relaxant effect is based on inhibition of the intraneural transmission of impulses in the central nervous system. The principal pharmacological activities develop within 10 to 15 minutes after intramuscular injection in horses and Cervidae, and within 3 to 5 minutes following intravenous administration in horses.

A sleeplike state, the depth of which is dose-dependent, is usually maintained for 1 to 2 hours, while analgesia lasts from 15 to 30 minutes. The centrally acting muscle-relaxant effect causes relaxation of the skeletal musculature complementing sedation and analgesia.

In horses and Cervidae under the influence of xylazine, the respiratory rate is reduced as in natural sleep. Following treatment with xylazine, the heart rate is decreased and a transient change in the conductivity of the cardiac muscle may occur, as evidenced by a partial atrioventricular block.

This resembles the atrioventricular block often observed in normal horses.^{1,2,3,4} Although a partial A-V block may occasionally occur following intramuscular injection of xylazine, the incidence is less than when it is administered intravenously. Intravenous administration of xylazine causes a transient rise in blood pressure, followed by a slight decrease.

Xylazine has no effect on blood clotting time or other hematologic parameters.

engage in healthier behaviors (i.e., exercise, healthy eating), experience more self-confidence, and are less depressed, anxious and stressed, among other benefits.^{6,7}

For some, the term self-compassion itself can be repellant or even something to be feared and avoided—a third rail, so to speak. I fell into that category for a good while. I kept the concept at arm's length. I was afraid that if I slowed down and truly looked at the hard things that had happened in my life, I'd be overwhelmed by them.

Becoming a veterinarian requires a good measure of self-sacrifice, grit and determination. And the tools we used get to where we are today might have included distancing ourselves from the sacrifices, losses and tough experiences along the way. Over time, this can result in disconnection within ourselves and the need to use valuable energy to deny parts of our experiences and ourselves.

Practicing self-compassion provides another option to this disconnection.

We can also appreciate that when we act with self-compassion, we diminish

the threat and trauma we experience, which in turn supports a more meaningful response to the difficult situation in which we find ourselves.

Take-Home Message

When considering how to incorporate the practice of self-compassion into your daily life, there are a few key areas that provide significant rewards.

The first is using it to influence your self-talk on a daily basis. Embracing self-compassion can help you quiet your inner critic and use more encouraging and supportive language.

The second is to use it to fuel setting and asserting boundaries you want and need to be your best self.

Finally, self-compassion can be leveraged when we are looking to grow in any area of our life—personal or professional. Learning is often a challenging process and practicing self-compassion can help de-risk the process.

Remember that practicing self-compassion has benefits that extend beyond ourselves. This is because we cannot truly extend deep, meaningful compas-

sion to others when we cannot or are not extending compassion to ourselves.

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