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## Opportunities

**B**y the time you get this magazine, the first quarter of 2021 will nearly be over. How's your business going? If you had downturns in 2020 due to the pandemic, have you planned and implemented how you are going to make up ground this year? If you were more profitable than normal last year, have you analyzed what was working for you to increase those segments of your business this year?

The old saying "If you don't know where you are, you can't plan where you're going" is absolutely true for the business of equine veterinary practice.

Are you starting out 2021 with a new practice, new partners, new associates, new facilities or new business owners?

Are you at the point in your career where you know you will be retiring in the next five or 10 years?

Are you a new graduate seeking opportunities to engage with a practice that will mentor you to become not only a better veterinarian, but a potential partner in the practice?

Are you a veterinary student trying to figure out whether you can get a job that will pay you enough to retire your student debts and still have a life and family?

Each of these phases of your career requires thoughtful planning and action.

As a growing business, you have to keep up with not only the financial requirements of growth, but the human resources side. Since most veterinary graduates are now women, you need to ensure your practice offers equality in work, pay and benefits.

As someone nearing retirement, now might be the best time to seek out partners, purchasers or investors (private or corporate) to start those discussions. Often a new owner will want the current veterinarian to remain with the practice for a

time during the transition from one owner to the next. Don't cut your retirement short in case you need to help with ownership transition for your business.

New graduates are coming out of school at a great time. There is a need for talented equine veterinarians, especially if you have additional hands-on experience prior to entering your first full-time job.

Even if you have a year or more until graduation, check out the AAEP Career Center to look at the positions that are out there. That will give you an idea of the types of jobs that are available and the skillset the practices are seeking and for which they're paying top dollar. In addition, you can listen to The Business of Practice podcast on the AAEP Career Center. Find that podcast on your favorite podcast network or on EquiManagement.com.



### Speaking of Podcasts

EquiManagement hosts two podcasts. Disease Du Jour focuses on the equine health and research side of veterinary medicine. This year, the podcast is focusing more episodes on field skills that you can use in daily practice. We are pleased to partner with sponsor Merck Animal Health to bring you this podcast in 2021.

We started the year with "Repro 101: Breeding Mares" for those who don't usually manage pregnant mares and breeding farms. Other topics this year include "Hoof Wall and Coronary Band Injuries," "Forelimb Rehab Tips" and the "Merck/AVMA Veterinarian Wellness Study."

The Business of Practice podcast, brought to you by Dechra Veterinary Products, has produced 2021 podcasts on "Budgeting 101," "Avoiding Malpractice Complaints," "Parenting Tips for Veterinarians," "Creating Healthier Practice Spaces" and "Growing Your Practice." **EM**



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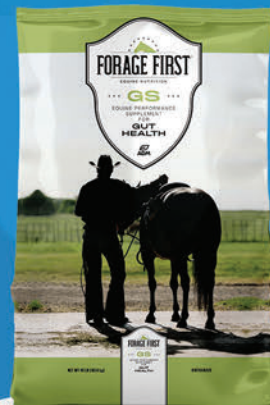


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## What To Do About an Aging Immune System?

It is well accepted that as animals and humans age, their immune systems undergo a decrease in competency, referred to as “immunosenescence.”

Dianne McFarlane, DVM, PhD, DACVIM, presented answers to oft-asked questions at the 2020 British Equine Veterinary Association (BEVA) conference in the United Kingdom.

She summarized what is known about immune function in aged horses:

- Total lymphocytes and lymphocytic proliferation decrease.
- T helper cells, T cytotoxic cells and B cells decrease.
- Pro-inflammatory state increases.
- Neutrophil chemotaxis increases but with no change in neutrophil function.

Based on such changes, of main concern to equine practitioners is how well aged horses are able to respond to immunizations. Younger humans respond two to four times better to influenza vaccine than the elderly. Investigation of aged horse response to equine influenza virus found that aged horses respond less well than young horses.

McFarlane reported, “Older horses may have some limited immunological deficits in responding to vaccination, but they still mount an adequate response.”

Endoparasitism is another preventive target that is especially important for older horses. One of the largest studies (2,500 equids) showed that there is no increase in fecal egg counts of strongyles in aged horses; however, tapeworm infection might be more prevalent with age.

Immune suppression from pituitary pars intermedia dysfunction (PPID) has definite adverse effects on neutrophil function as well as altered inflammatory cytokine profiles, said McFarlane. Equine practitioners commonly identify chronic infections—bacterial infections



ISTOCK

**Older equines might not respond as well as younger equines to vaccines and could be more prone to tapeworm infections.**

and increased parasite egg shedding, for example—in PPID individuals, especially compared to age-matched controls.

McFarlane stressed the importance of biosecurity measures and herd health preventive practices that apply to all horses, saying that they should be implemented for aging horse populations, as well. Preventive health strategies for geriatric horses should include immunizations for exposure to endemic diseases as well as potential infections with high-risk consequences. It is notable that WNV and EHV-1 tend to hit aging horses harder than younger horses, so it is recommended to ensure that these vaccines are included in vaccination strategies. McFarlane commented that fecal egg counts are advisable at seasonably strategic times to identify high shedders. PPID testing is important, especially for geriatric individuals with chronic infections, high levels of parasite egg shedding or other suspicious signs of hormonal dysfunction.

## Gait Abnormalities at a Walk

Under most circumstances, lameness exams concentrate primarily on gait analysis at the trot. However, there are conditions that might yield significant information at walking speeds.

At the 2019 annual WEVA (World Equine Veterinary Association) International Congress in Verona, Italy, Sue Dyson, MA, VetMB, PhD, DEO, FRCVS, explained about some particular findings one might glean when assessing a horse at this slower gait, moving freely and/or under saddle.

Dyson pointed out some specific anomalies to look for:

- With load bearing, hyperextension of a rear fetlock could indicate suspensory apparatus dysfunction.
- Reduced extension of the fetlock tends to point to lameness.
- Hyperflexion of a hindlimb with load bearing can signal gastrocnemius rupture or avulsion.
- Stifle pain might cause a horse to toe

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out a rear limb, which is more visible at a walk or standing at rest than at a trot.

- Pacing on a downhill incline might be evident at walk but not a trot. This does not necessarily reflect a problem.
- Unwillingness to load the heel at a walk reflects injury to the deep digital flexor tendon or its accessory ligament.

A horse with both forelimb and hindlimb lameness issues might be more noticeably lame at the walk than trot. Dyson remarked that there could be a longer duration of the stance phase at the walk and more distal joint extension than what you might see with the trot. Severe foot pain might cause a horse to exaggerate its lateral wall foot contact, with the foot placed wide.

She characterized another gait

modification that is more obvious at a walk when the rider takes up contact and the horse steps short on one hindlimb. These horses appear normal on a loose rein, with in-hand walking and at the trot. Further workup with diagnostic nerve blocks, NSAIDs trials, nuclear scintigraphy, saddle changes or bareback riding does not alter this gait abnormality at the walk with rein contact. This provides information to the rider and trainer and helps to rule out many conditions.

Hock “wobble”—oscillation from side to side during the stance phase—might also involve hock rotation such that the cannon bone is loaded in a non-vertical plane. Dyson noted that this is often an incidental finding, although it might indicate poor muscular strength. Over time, such alteration in ground reaction forces through the limb could lead to musculoskeletal

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### Ovarian neoplasms in mares can create some difficult behavioral changes for owners.

problems such as osteoarthritis. Specific exercises to improve muscular strength are beneficial to horses with this movement abnormality.

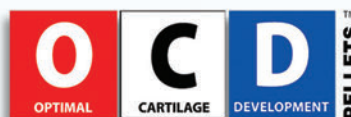
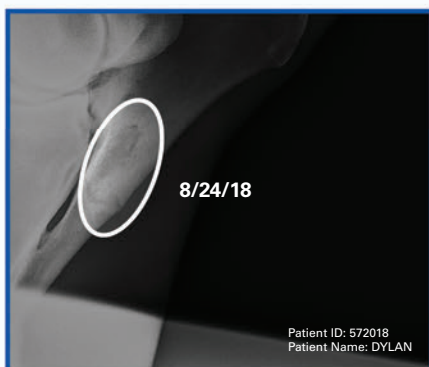
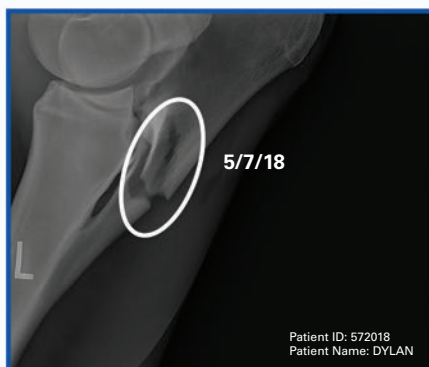
The walk is the best gait in which to

see fibrotic myopathy abnormalities with reduced cranial phase of the stride due to fibrosis of one or more of the thigh muscles. Also, the walk identifies the goose-stepping hyperflexion of

stringhalt; in this case, there is no limb abduction. A horse with shivers from a cerebellar lesion experiences hyperflexion or hyperextension at the walk with limb abduction, yet tends to trot normally. At the walk, it might also be possible to identify catching of the stifle with upward fixation of the patella.

Braciocephalicus muscle strain of the neck might cause a horse to elevate its head and neck as the lame limb protracts at the walk. Often a horse with such an injury appears normal at trot. Biceps brachii tendon injury might only elicit lameness at the walk under saddle.

These are just a few examples of lameness issues and pathological conditions that are apparent at a walking gait. It helps to move the horse out on various surfaces—soft, hard or inclined—at *all* gaits, both in-hand and under saddle, to assist in lameness diagnosis.



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**Mares treated with GnRH vaccines showed decreased aggressive behavior, but some mares might develop irreversible changes in the hypothalamic-pituitary-gonadal axis that lead to a lack of ovarian activity, despite treatment.**

## GnRH Vaccine for Granulosa Cell Tumors

Ovarian neoplasms in mares can create difficult behavioral challenges for owners. Granulosa cell tumors (GCT) and granulosa theca cell tumors (GTCT) comprise 2.5% of all tumors found in horses. They might start out as slow-growing, benign, unilateral masses, but as they enlarge, a mare tends to exhibit stallion-like behavior and aggression.

Behavioral changes, transrectal palpation and ultrasound—along with laboratory estimates of serum testosterone, progesterone, estradiol, inhibin and anti-müllerian hormone (AMH)—are useful for diagnosis. Even in early growth stages, AMH has been recognized as a sensitive indicator of these tumors at levels greater than 4 ng/ml.

A study examined the off-label use of GnRH vaccines as a way to manage these ovarian neoplasms for mare owners reluctant to pursue surgery [Behrendt, D.; Burger, D.; Greemmes, S.; et al. Active immunization against GnRH as a treatment for unilateral granulosa theca cell tumour in mares. *Equine Veterinary Journal* Sept 2020; [https://](https://doi.org/10.1111/evj.13352)

[doi.org/10.1111/evj.13352](https://doi.org/10.1111/evj.13352)].

Historically, GnRH vaccines have been used in cryptorchid stallions to control behavior prior to surgical castration. The objective in this study was to use GnRH vaccines (Improvac by Zoetis or Equity by Pfizer) to suppress ovarian activity through antibodies that bind to endogenous GnRH.

The study used four warmblood mares ages 8-13 years that exhibited stallion-like or aggressive behavior, had the presence of a unilateral GTCT and had hypoplasia of the opposite ovary. Transrectal palpation and ultrasound identified the nature of the two ovaries. Each mare was given an IM injection of 200 mg GnRH-protein conjugate (Improvac), and this was boosted 13-33 days later. Additional boosters were given based on observed behavior.

The results of blood analysis of the various hormones mentioned above, as well as the modifications in mare behavior, were favorable:

- AMH levels decreased after the second vaccination in three mares.
- Testosterone levels decreased to baseline in all mares after two or three vaccinations.

- Aggressive behavior subsided after the initial injection and was completely eliminated after the second injection.
- The affected ovary reduced in size in all mares. The affected ovary in two mares that were followed for 6-7 years did not increase in size.
- Suppression of ovarian activity lasted for at least three months following injection.

Mild side effects of neck stiffness and localized swelling were noted provided the dosage did not exceed 200 mg. A larger dose has the potential to lead to anaphylactic shock and death.

In a previous study, 84% of cases experienced reductions in unwanted behavior in mares and stallions when vaccinated with a similar GnRH vaccine (Equity) twice at a four-week interval. Use of either GnRH vaccine elicited return of ovarian cyclic activity in 92-98% of treated mares within two years of the last vaccination. The authors noted that some mares might develop irreversible changes in the hypothalamic-pituitary-gonadal axis that lead to lack of ovarian activity, despite treatment.

The study was limited by the absence of an untreated control group as well as standardization of vaccination protocol and frequency. Owners reported on their horses' behavior with no standardization of behavioral scoring. It should also be noted that at this time, FEI (Federation Equestre Internationale) allows this type of vaccination in competition horses, but the International Federation of Horseracing Authorities does not.

In summary, the authors stated, "GnRH immunization reduces or eliminates behavioral abnormalities and stops tumor growth." An additional caveat is that allowing an ovarian neoplasm to remain does increase the risk of increased growth, bleeding and adhesions, making it important to continue to monitor mares treated with GnRH vaccine. **EM**

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# Essentials for Telemedicine

**A**lthough many veterinarians have remained leery of providing veterinary opinions remotely, the pandemic created conditions that have accelerated the trend. As equine practitioners have seen an increase in the demand for their services and have struggled to hire associates, something had to change to allow them to provide care to their patients more efficiently.

If you feel unsure about the concept of telemedicine, please note that if you answer questions sent by text or e-mail, or have looked at a cell phone photo or video to decide whether an emergency visit is warranted, you are already practicing telemedicine.

When offering a telemedicine service, you need to market the service in a way that clients want it, have a mechanism to easily schedule appointments, a method for collecting payments, a standard way to conduct the “visit” and an efficient way to create the medical record entry.

One of the difficult aspects of telemedicine is properly documenting the encounter in order to have a complete medical record. Here is where a telemedicine platform comes in handy. As virtual interactions with clients have become more ubiquitous, companies have stepped into the gap and developed a variety of service applications. You certainly do not need a special platform to provide value to your clients, and you

can document visits with screenshots and handwritten notes. However, a telemedicine app can make the documentation nearly seamless and allow you to easily monetize your time providing the service.

If you prefer DIY (do-it-yourself), appointments for virtual visits can be made with your receptionist, just like in-person farm calls are scheduled. The doctor can then utilize free meeting options such as Zoom or Google Meet and

need to understand how you intend to utilize telemedicine.

Will you create a list of appropriate situations or cases so your whole team is on the same page? Are you limiting telemedicine to rechecks? Are you allowing its use for new issues?

Determining your price list for different telemedicine services before beginning to offer them is essential. Because you only have your time to sell, giving free advice limits your income and your

practice’s success. So when does giving advice need to be an official telemedicine consult?

If you do decide to try a telemedicine platform, you should look carefully at all options through the lens of your clients. The use of the platform should be easy and require little technological expertise. The interface should be simple and clear, allowing payment options and documentation of the visit.

The cost should be affordable for your practice for the number of times you believe the service will be utilized. You should explore whether multiple doctors can utilize the application simultaneously, whether confidentiality and security are robust, and whether an integration with your practice management software is offered.

Times are changing, and while adopting new strategies can be stressful, ultimately they can help your practice excel. **EM**



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open those apps on a phone or laptop. Medical records can be created in the same fashion as if the veterinarian were there in person. Invoicing for telemedicine appointments can be created as the medical record is entered into the management software and e-mailed or mailed by the postal service to the client in the practice’s usual way.

Before you begin providing telemedicine services or consider researching and comparing telemedicine platforms, you



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# DJD: What We Know, What We're Learning

*American Regent Animal Health, a division of American Regent, Inc., makers of Adequan® i.m. (polysulfated glycosaminoglycan), convened eight equine practitioners to discuss the present and future of degenerative joint disease (DJD) diagnosis and treatment.*

By Kimberly S. Brown



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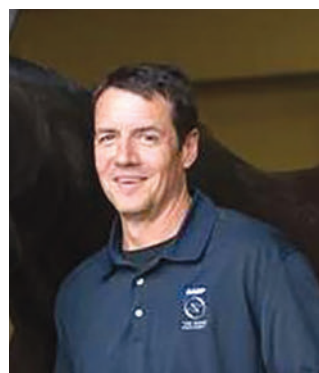
Any changes veterinarians are seeing in the frequency of DJD among today's horses are "probably due more to us getting better at diagnosis than the animals getting more disease," said Dr. Kent Allen.



Dr. Kent Allen



Dr. Robin Dabareiner



Dr. Christopher E. Kawcak

Research shows that a large portion of the horse population veterinarians serve today is aged, many with second or third careers. There also are fewer horses being bred and raised to take the place of the population of older competitors and companion horses. That means veterinarians need to become involved earlier in the degenerative joint disease (DJD) process in order

to extend the competitive or useful lives of the horses in their practices.

In order to better understand the disease and how veterinarians can potentially slow the degenerative process, American Regent Animal Health—the makers of Adequan® i.m. (polysulfated glycosaminoglycan)—brought together a group of equine practitioners for a half-day discussion on the diagnosis and treatment of

DJD. Following are useful tidbits and advice from these practitioners. (For an extended report of this meeting, please visit [EquiManagement.com/arrah](http://EquiManagement.com/arrah).)

This group included **Kent Allen**, DVM, owner of Virginia Equine Imaging and a founder of the International Society of Equine Locomotor Pathology (ISELP); **Robin Dabareiner**, DVM, PhD, DACVS, who worked at Texas A&M for 23 years before

working at Waller Equine Hospital in Texas; **Christopher E. Kawcak**, DVM, PhD, DACVS, DACVSMR, ACVS Founding Fellow/MIS, who is the director of Equine Clinical Services at Colorado State University (CSU); **Zach Loppnow**, DVM, an associate veterinarian at Anoka Equine Veterinary Services in Minnesota; **Rick Mitchell**, DVM, MRCVS, DACVSMR, an owner of Fairfield Equine Associates and a founding member of



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1 Data on file.

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

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PP-AI-US-0372 02/2020



There was a consensus with the veterinarians on this panel that owners and trainers have caused DJD to be “under-diagnosed and over-treated.”

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Dr. Zach Loppnow



Dr. Rick Mitchell



Dr. Kyla Ortved



Dr. Kelly Tisher



Dr. Gary White

ISELP; Kyla Ortved, DVM, PhD, DACVS, DACVSMR, the Jacques Jenny Endowed Term

Chair of Orthopedic Surgery at the University of Pennsylvania’s New Bolton Center; Kelly Tisher, DVM, managing partner at Littleton Equine Medical Center in Colorado; and Gary White, DVM, owner of Sallisaw Equine Clinic in Oklahoma. All are paid consultants of American Regent, Inc. *The opinions expressed by the consultants may not be the opinions of American Regent Animal Health or American Regent, Inc.*

## SEEING MORE OR IMAGING BETTER?

The group agreed that most changes veterinarians are seeing in the frequency of DJD among today’s horses are “probably due more to us getting better at diagnosis than the animals getting more disease,” said Allen.

However, Kawcak said there are some categories of horses that appear to have increased incidence of DJD. “I deal with a fair number of

young cutting horses ... I do think in those young, hard-working, active athletes with that big push in their 3-year-old year that the incidence [of DJD] has gone up, especially in stifles and hocks.”

Kawcak said he thinks that veterinarians who don’t use a lot of CT and MRI are probably under-diagnosing DJD. “I think we’re surprised about how many times a relatively normal-looking joint on radiographs will have fairly

substantial changes on MRI or CT,” said Kawcak.

There was a consensus that as equine diagnostics become better, easier and more available—particularly with the advent of the standing CT scanner—more disease will be found. That means the ability to find DJD and identify it earlier in the disease process will bring more attention to this problem in all ages of horses.

Tisher mentioned the “diagnosis dilemma” with young horses. “Where does degenerative joint disease become the diagnosis, when you maybe don’t have imaging changes, but you do have the strong sense of synovitis, capsulitis and [the] need to manage that horse at a young age?” Tisher asked.

## DJD TREATMENTS DISCUSSED

Mitchell summarized the group’s feelings that there is no “one-size-fits-all” approach when it comes to DJD treatment.

A theme mentioned several times was the importance of proactively managing cartilage and joint problems. Mitchell said he asks clients, “What’s it going to cost you to replace this horse? Compare that expense to what it would cost to maintain this horse properly.”

The group agreed that while there might be difference in ability to pay for diagnostics and treatments, it didn’t matter whether the horse was a top-level performer, a mid-level athlete or a backyard/senior horse: Veterinarians should “offer the best alternative first, [and] if that’s not workable, find out what is,” summed up White.

Tisher voiced what the group felt was an overriding

issue: oral joint supplements. “We spend an awful lot of time talking with clients about feed-through oral supplements,” he said. “I’ve used some products myself, so I feel like perhaps there is a place [for them].” But “if you add up what your feed-through costs [are], you may be able to do a box of Adequan i.m. as an FDA-approved product for about half the price that you’re paying for that product.”

Tisher said that non-FDA-approved injectable products—mostly those that are called “medical devices”—are a harder subject to discuss with owners. “People think that if it comes in a vial and is injected, that it must be FDA-approved and it must have a safety margin with it. As a practice, we really steer clear of those products.”

## TAKE-HOME MESSAGE

With an aging equine population that owners want to continue riding and competing and fewer young horses coming up to take the place of retiring seniors, proper veterinary care throughout life becomes even more important. That includes the diagnosis and treatment of DJD.

Successfully intervening in DJD early requires communication between veterinarians and owners. That includes talking about FDA-approved products such as Adequan i.m., which is scientifically proven to help slow the progression of DJD.<sup>1</sup> Veterinarians and owners must communicate about the product to ensure it is being used according to label instructions in order to provide the best outcomes for horses.

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

## Use of Adequan® i.m. (polysulfated glycosaminoglycan)

“Adequan i.m. is something that we’ve all used for years, and certainly it plays an important role [for] the equine athlete,” said **Kent Allen**, DVM.

**Rick Mitchell**, DVM, MRCVS, DACVSMR, said that early in his career, the FEI did not allow the use of Adequan i.m. and similar FDA-approved products. “We have seen a perceived difference in the health and welfare and soundness of the horses since we’ve been able to use those products,” said Mitchell.

**Chris Kawcak**, DVM, PhD, DACVS, DACVSMR, ACVS Founding Fellow/MIS, said that Adequan [i.m.] obviously has stood the test of time. “If we want to improve communication around Adequan i.m., I think making sure that the dosing paradigm is communicated clearly [is important], because there are many people who don’t use it according to the label.”

**Kelly Tisher**, DVM, noted that for the backyard horse, the medium-level horse and the high-end horse, Adequan [i.m.] for DJD is “such a great product to recommend for all three of those groups. For the group of backyard horses, that is a reasonably cost-effective way to do a really good job of helping that horse’s joints. The medium performance horse for the same reasons, plus or minus some more intensive intra-articular therapies. And the high-level horse to perhaps take that interval of joint injections and extend it.”

Mitchell also said he sees owners more willing to use Adequan i.m. because of the ease of administration. “It does not have to be given by the veterinarian every time,” though it must always be given under the guidance of a veterinarian, Mitchell added that “the relatively low reaction rate if given properly is also very comforting [when] handing the product to someone who may not be the most experienced injection administrator.”

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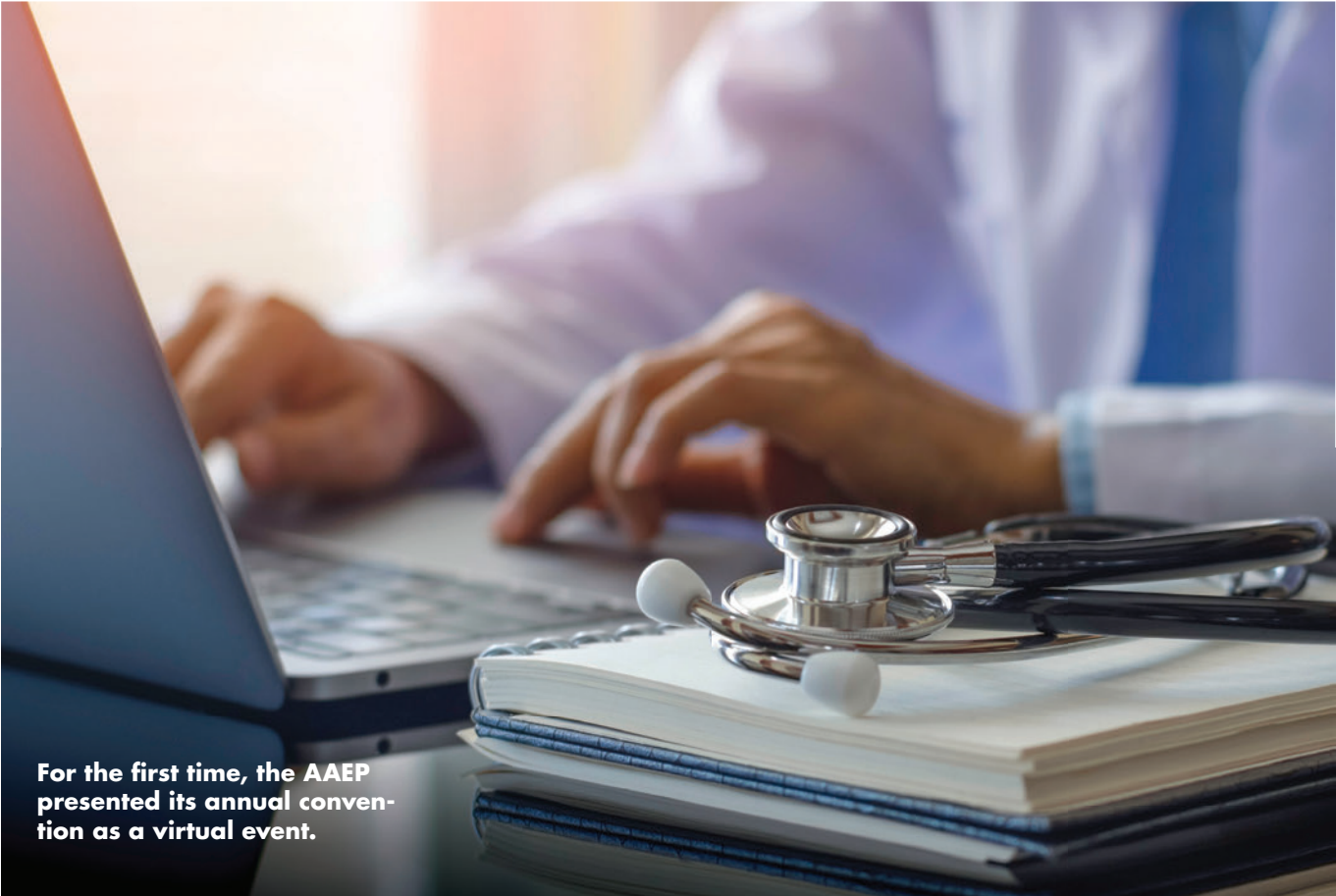
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**For the first time, the AAEP presented its annual convention as a virtual event.**

# AAEP Convention Research Presentations

The 2020 AAEP Virtual Convention offered many equine health and research topics that you can put to use in your practice today.

By Nancy S. Loving, DVM

**D**ue to the COVID-19 pandemic, the American Association of Equine Practitioners (AAEP) elected to hold its 2020 Annual Convention as a virtual meeting for the first time in its history. While most veterinarians said they missed the camaraderie of the live meeting, it was apparent from the online attendance and participation that this alternative gath-

ering was more than just an acceptable alternative. Notes in several of the chats indicated that more of this type of education would be welcomed by members, even after the return to live meetings offering person-to-person interaction.

The 2020 AAEP Convention was a mix of live and on-demand presentations and table topics. All content was then provided as on-demand, and anyone who registered for the Virtual Conven-

tion can continue to watch presentations until June 30, 2021.

Following are summaries of some of the research discussions, presentations and table topics included in the 2020 AAEP Virtual Convention.

Please note that EquiManagement has additional coverage of presentations on EquiManagement.com. Also provided is an audio wrap-up on the Disease Du Jour podcast of December 31, 2020,

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**Feeding strategies  
have a large impact  
on omeprazole  
absorption.**

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## How To Optimize Omeprazole Efficacy

Gastric ulcer disease (EGUS) is frequently diagnosed in horses, and therapy often relies on using the gold standard drug, omeprazole. While this medication has demonstrated good results, it is accompanied by a significant financial outlay by clients and does

not always achieve full resolution. At the 2020 AAEP Virtual Convention, Ben Sykes, BSc, BVMS, MS, MBA, DCVIM, DECEIM, PhD, presented some useful information about how to get the best results for less.

He described how omeprazole given at the full dose (4.4 mg/kg) often results in an incomplete treatment response, with 77% of squamous lesions (EGSD) healing or returning to  $\leq$  Grade 1 by Day 28. Sykes stresses that 23% do not

heal completely, although 92% achieve some improvement and 8% have no response at all. Across a wide range of omeprazole studies, 70-80% heal to Grade 0 or 1, yet 20-30% have a suboptimal or absence of response, and this is worse with glandular disease (EGGD).

Sykes stressed that feeding strategies have a large impact on omeprazole absorption. He reviewed multiple omeprazole studies to demonstrate his point.

He posed the question: Can we get the same results with less drug? A study compared three doses of oral omeprazole in treatment of equine gastric ulcer disease:

- 1 mg/kg
- 2mg/kg
- 4 mg/kg

The horses in the study were fasted overnight and fed two to three hours after medication administration. All three doses resulted in the same effect of 86% healing of squamous mucosa to  $\leq$  Grade 1.

Another study looked at the effects of dose and diet on pharmacokinetics of omeprazole. The conclusion was that a horse fasted overnight can absorb two to three times as much drug than when *ad lib* hay is accessible. Therefore, it is possible to decrease the dose of the drug by 50% in a fasted horse and expect the same results with squamous ulcer disease as seen at a higher dose on an unfasted horse.

An optimal dietary strategy works as follows: Remove feed at 10 p.m., give omeprazole at 7 a.m., give the morning feed at 8 a.m., turn the horse out to pasture or offer *ad lib* hay, then give evening feed at 6 p.m. and remove feed at 10 p.m.

Glandular disease requires a higher threshold of acid suppression. If fed *ad lib* hay only, even at 4 mg/kg, there is acid suppression only 40-50% of the time. Human studies indicate a need for acid suppression at least two-thirds of the time for healing. Horses fed an optimal diet that includes overnight fasting

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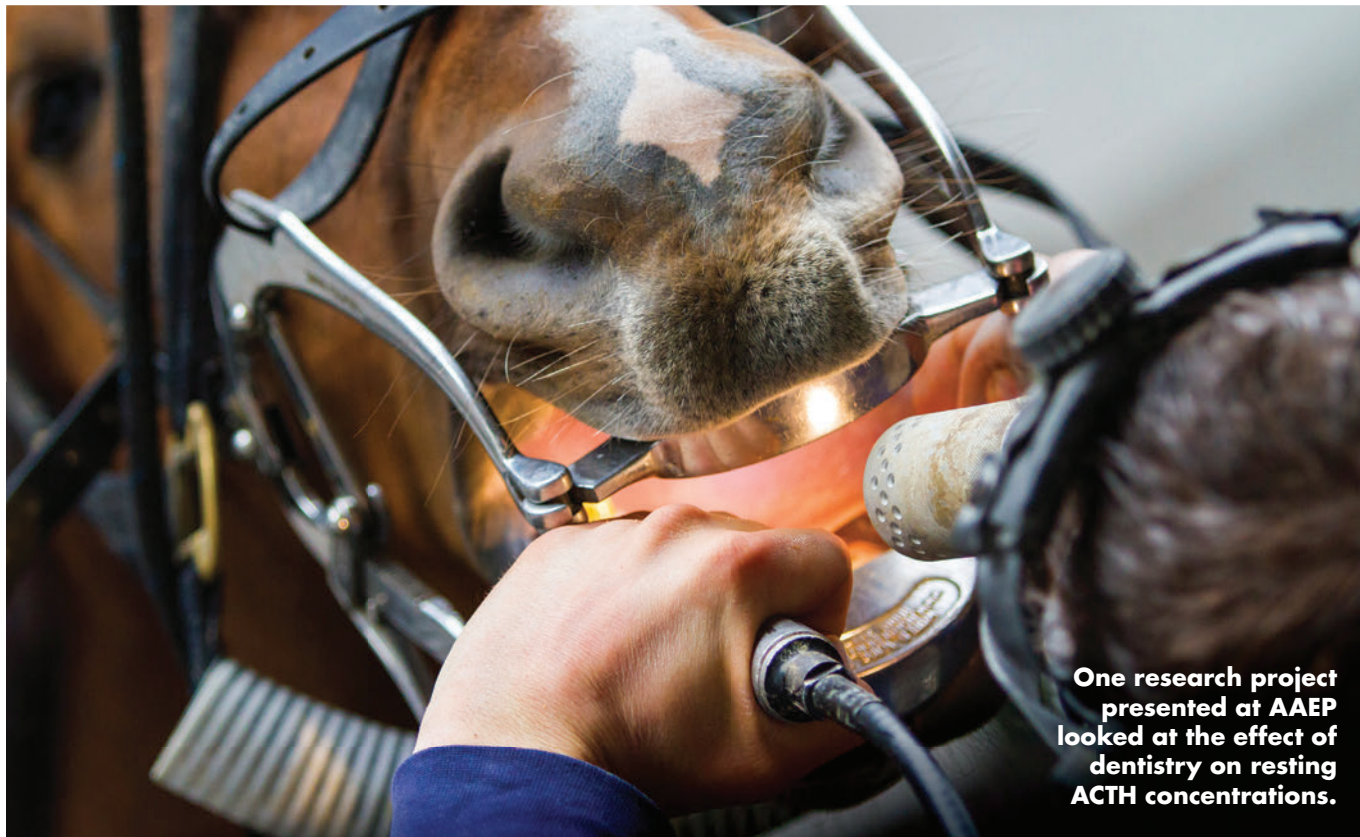
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**One research project presented at AAEP looked at the effect of dentistry on resting ACTH concentrations.**

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might achieve acid suppression 80% of the time to maintain the pH  $\geq 4$  when treated with omeprazole at 4 mg/kg.

Another important point Sykes emphasized was that there is a difference between diets for treating pharmacologically (need to fast, then medicate, then wait an hour or two, then feed) and how one should feed (*ad lib* hay) for long-term management. It is noted that *ad lib* hay is intended for horses with squamous ulcer disease, not glandular. Sykes also pointed out that horses don't eat continuously over 24 hours. In fact, they don't tend to eat much overnight into the wee hours, so fasting them after 10 p.m. doesn't significantly modify natural behavior. The objective of an overnight fast is to stop morning eating before an owner can administer omeprazole to the horse.

Sykes explained that omeprazole is a pro-drug that requires exposure to acid within the parietal cells to activate its inactive pro-drug form. To achieve the maximal drug effect, the objective is to turn on as many proton pumps as possi-

ble so the active drug can then inhibit a large array of proton pumps. Peak drug concentration of omeprazole occurs 30-60 minutes (and up to 90 minutes) after administration, and that is the time to achieve maximum drug activation with later absorption in the small intestine. While possibly posing a management challenge for horse owners, the target strategy is to administer oral omeprazole, then feed an hour later. Despite this strategy, omeprazole still doesn't achieve 24 hours of acid suppression.

Preliminary investigations into a long-acting injectable intramuscular formulation of omeprazole (available only in Australia) that is dosed once weekly resulted in 100% squamous resolution to Grade 0 and 75% resolution for glandular ulcers.

Sykes notes that with this product, good acid suppression can elicit complete squamous healing and good improvement for glandular healing *regardless of ongoing risk factors*. Glandular healing requires more acid suppression, and that impacts dose selection.

A look at misoprostol showed it is superior to a combination of omeprazole and sucralfate for treating EGGD: Failure rate for misoprostol is 28% compared to 80% for omeprazole/sucralfate.

He pointed out that giving misoprostol or ranitidine concurrently with omeprazole is contraindicated, because they will stop the parietal cell activation by omeprazole. When using misoprostol with omeprazole, the two drugs must be staggered at different times. Misoprostol is associated with some significant side effects, so it must be used with caution.

In conclusion, Sykes summarized that if a horse is fed an optimal dietary strategy—fast overnight, medicate with omeprazole, then feed an hour later—ESGD can be treated with 2 mg/kg omeprazole and EGGD can be treated with 4 mg/kg daily plus sucralfate (12-20 mg/kg two-three times per day).

For squamous ulcer disease, the half-dose (2 mg/kg) omeprazole can be increased if there is an inadequate response, as some horses poorly absorb the drug.



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## Impact of Concurrent Treatment with Omeprazole and Phenylbutazone-Induced Gastric Ulceration

It is common for equine practitioners to prescribe the use of omeprazole when horses are treated with NSAIDs for any number of ailments, especially since the glandular stomach mucosa is most impacted adversely by NSAIDs. At the 2020 AAEP Virtual Convention, Heidi Banse, DVM, PhD, DACVIM, assistant professor of equine medicine at the Louisiana State University School of Veterinary Medicine, discussed a study evaluating concurrent omeprazole (OMP) and phenylbutazone (PBZ) use.

In this study, 22 horses with EGUS  $\leq$  Grade 2 (out of 4) were split into three groups:

- treated with 4.4 mg/kg bid x 14 days – n = 8
- treated with 4.4 mg/kg PBZ bid and 4 mg/kg OMP daily – n = 8

- controls treated with 10 ml corn syrup bid – n = 6

The horses were then scoped on Days 0, 7 and 14. Gastric fluid was collected for pH evaluation, and CBC and chemistries were run. The horses were also monitored for colic and diarrhea.

The results indicate that there is no difference in equine squamous gastric disease scores over time with any of the three treatments. The glandular ulcer scores worsened in PBZ horses, but not the OMP/PBZ group. The pH in the PBZ/OMP group increased compared to the horses receiving only PBZ. Albumin and total protein differed (decreased) between the control horses and PBZ-treated horses. There were no differences in other blood work and parameters such as creatinine, WBC, PCV or pain.

However, there were significant clinical complications. By Days 2-11, eight horses developed diarrhea or colic. Of the PBZ group, 2/8 did not complete

the study due to colon impactions. Of the OMP/PBZ group, six horses had complications and three did not complete the study. The complications seen were impaction, undetermined colic and diarrhea. Two horses died—one from cellulitis and necrotizing typhocolitis with secondary sepsis, and the other from ulcerative and necrotizing hemorrhagic enterocolitis with septic peritonitis.

Gastrointestinal complications were observed in both the PBZ and PBZ/OMP groups but were more frequent in those treated with OMP/PBZ.

In conclusion, omeprazole appears to protect against equine glandular ulcer disease but might exacerbate gastrointestinal disease, possibly due to reduced motility from NSAIDs. Similar findings have been demonstrated in humans receiving the combination of OMP and NSAIDs.

The authors urge equine practitioners to be cautious when co-administering omeprazole and NSAIDs in the face of other risk factors.

## Practical Clinical Research Results To Consider When Testing for PPID

There have been questions about the accuracy of thyrotropin releasing hormone (TRH) testing for pituitary pars intermedia dysfunction (PPID) centered around handling of testing components and blood obtained from the test, or how certain stress situations could affect a horse's adrenocorticotropin hormone (ACTH) concentrations. As presented by John Haffner, DVM, of Middle Tennessee State University Horse Science Center, several studies have yielded some encouraging results.

### *Duration of Effectiveness of Frozen/Thawed TRH*

When running a TRH stimulation test, often the bottle of TRH purchased is enough for five tests. Haffner described research that evaluated the longevity of TRH when frozen in saline in a 3 cc



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syringe at minus 20 degrees Celsius, then was thawed. The study looked at two groups. The first group ran a TRH stimulation test on Days 0, 14 and 42 after thawing the frozen TRH. The second group looked at results of the TRH test when used on Days 0, 28 and 56 after being thawed. The results are favorable: Compared to day 0, ACTH concentration did not change out to day 56. The study concluded that TRH is fine to use if refrigerated at 5 degrees C (41 degrees F) post-thaw for up to 56 days.

### ***Effect of Trailering or Dentistry on Resting ACTH***

Another research project looked at the effect of hauling and dentistry on resting ACTH concentrations. Horses a) were trailered for 40 minutes; or b) received five minutes of teeth floating with IV xylazine for the dental procedure; or c) were tied in a stall.

Three groups of four non-PPID horses were subjected to all three of these practices with a four-week interval in between each trial. ACTH was measured before the procedure and at time 0 (for trailer or dentistry), 15, 30, 60 and 120 minutes.

The horses that underwent dentistry or were stalled had no changes in ACTH from baseline. However, the trailered horses had an increase in basal ACTH for at least 30 minutes, at which point ACTH returned to normal with the exception of one horse that had elevated ACTH through the entire two hours.

### ***TRH Repeatability***

Another clinical test described by Haffner looked at the repeatability of TRH in PPID-negative and -positive horses. A TRH stimulation test was conducted monthly from February to June at 28-day intervals. Five horses in the study were PPID negative, five were PPID positive and two were PPID equivocal.

In general, there were consistent results, although three horses in the

study were inconsistent:

- One PPID negative tested positive once.
- One PPID negative tested positive twice.
- One PPID positive tested equivocal once.

The study concluded that ACTH levels at 10 minutes post-TRH administration is mostly repeatable from January through early June. However, Haffner stressed that a horse's history, clinical signs and laboratory data should all be considered when diagnosing PPID. "Don't just rely on blood testing," he said.

### ***Effect of Delayed Plasma Centrifugation on ACTH Concentrations***

Because it isn't always possible for a practitioner to return to the clinic immediately to spin down blood obtained during TRH stimulation testing, there are concerns that leaving whole blood in the

blood collection tubes for hours could affect measurement of ACTH concentrations.

Blood was taken from five PPID-positive and five PPID-negative horses, refrigerated at 7 degrees C (45 degrees F), then centrifuged at 0, 4, 8, 12, 24 and 36 hours after collection. Samples were sent to Cornell University's veterinary diagnostic lab for evaluation.

The good news is that there was no effect of delayed centrifugation on ACTH concentrations, and it is safe to refrigerate samples until the blood can be centrifuged back at the clinic.

### ***Freezing Effects on ACTH***

Haffner presented one more practical clinical concern about PPID testing: What is the effect of various freezing protocols on ACTH concentrations in plasma? Plasma was stored in three possible manners:

- at minus 20 degrees C

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- between ice packs at minus 20 degrees C
- at minus 80 degrees C

These three protocols took into account that freezers are often opened and closed many times before plasma samples are presented for evaluation. How does that affect maintaining sufficient frozen temperatures of the samples?

ACTH from these samples was measured on Days 0, 3, 7, 30, 60 and 90 for the minus 20 degrees C (minus 4 degrees F) and minus 80 degrees C (minus 112 degrees F) protocols. The minus 80 degrees C samples experienced some decrease in ACTH by Day 90, and the minus 20 degrees C showed some decrease by Day 60. The samples stored at minus 20 degrees C between ice packs were tested at Days 0, 3 and 7 with the finding that there was no decrease in ACTH concentrations out to seven days.

### **Safe Restraint of the Laterally Recumbent Horse**

Equine practitioners are often faced with incidents in which a horse becomes trapped in a stall or trailer, or tangled in obstacles, and cannot rise or extricate itself. The person who usually goes in first to attend to the horse is the equine vet, if only to administer sedatives or anesthetics to help responders free the horse with limited trauma.

At the 2020 AAEP Virtual Convention, Rebecca Husted, PhD, discussed how to handle these situations. She stressed that unless a horse is completely debilitated, exhausted or hypothermic to the point of not struggling, it is important to sedate the horse profoundly or to anesthetize it to limit risk of injury to personnel and to the horse. For starters, she suggested placing a simple blindfold or pad under the downside eye and a blindfold (towel) on the upside eye to help calm the horse. When possible, head protection should be placed on the horse.

It helps to get the horse in some supported sternal position, perhaps with the help of hay or straw bales. When sit-

ting sternally, many horses will recover more quickly, said Husted. However, often there are obstacles in stalls or horse trailers that prevent that, and if a horse is trapped in fencing, it makes it impossible to get a horse into a sternal position.

She urged veterinarians to protect themselves (and others) from ergonomic and kinetic (kick) injuries. This can be done by wearing a helmet and PPE, maintaining good body position, and keeping one's body out of the kill or crush zone.

Traditional methods of restraint of a recumbent horse have relied on a person kneeling on the horse's neck and tilting the nose up a bit with one's hands.

## *Veterinarians should protect themselves (and others) from ergonomic and kinetic (kick) injuries in the laterally recumbent horse.*

Husted noted that not only are some people too small to accomplish that, but a horse can push, pull or kick in its struggle and toss a person aside with little effort. She emphasized that such a kneeling position is reactionary and not ergonomic. Furthermore, the handler might be in the way of a practitioner needing to access the head or neck for jugular access, catheterization, ocular reflex evaluation, or mucous membrane and capillary refill time assessments.

Instead, a better strategy is to assume a standing position with one foot securely on solid ground and the other placed in the atlantooccipital space on the neck. A lead line is attached to the halter to tip the nose up. This standing strategy enables a handler to survey the whole scene, to move quickly out of the

way, and to apply good leverage on the neck and on the nose while keeping the horse's head and jugular area available for veterinary procedures.

### **Local and Systemic Response to Anthelmintic Treatment**

When using macrocyclic lactones (moxidectin or ivermectin) to treat for internal parasites, the pro-inflammatory responses are minimal in clinically healthy horses. Today's deworming target is the cyathostomins (small strongyles). Up to 98% of pastured horses have some small strongyles—not all 40 species and eight genera are clinically relevant or pathological.

At the 2020 AAEP Virtual Convention, Ashley Steuer, DVM, PhD, of Texas Tech University School of Veterinary Medicine, looked at deworming strategies and their effects on horses.

While the adult small strongyle lives in the intestinal lumen, larval stages (L3/L4) encyst in the mucosa and submucosa of the large intestine to potentially contribute to inflammation and disease. These parasites are developing deworming drug resistance. The adults are commonly resistant to pyrantel, have shown widespread resistance to benzimidazoles, and low levels of resistance are now being seen to macrocyclic lactones.

Two larvicidal treatments are available currently: a) fenbendazole with 50.4% efficacy; and b) moxidectin with 73.8% efficacy.

The inflammatory response to treatment is causing disease in some cases, although dewormers have been unjustly implicated as the cause. Greater signs of inflammation were apparent to larvae in tissue than in those horses without encysted larvae. At two weeks post-treatment, the local inflammatory response is less with moxidectin than with fenbendazole.

Steuer said that goblet cells play a role in nematode infection and in the inflammatory response, leading to active involvement of granuloma formation with nematode expulsion. The gob-

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Example of rain rot



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**Owner satisfaction was high in aggressive mares treated with elective bilateral ovariectomies.**

let cells produce mucins that aid in helminth expulsion, with cytokines and mucin as key in this process.

A study in September/October 2019 compared moxidectin to ivermectin in three groups of 12 horses each. The horses were 2-5 years old, kept on pasture, and clinically healthy throughout the study. The groups were treated as follows:

- moxidectin 0.4 mg/kg orally once
- ivermectin 0.2 mg/kg orally once
- controls received no treatment

Blood was collected weekly and the horses were euthanized at either two or five weeks post-treatment to provide

tissue from the cecum, ventral colon and dorsal colon for histopathology and gene expression studies. While there were no significant differences in inflammatory grading on histopathology, goblet cell hyperplasia differed at two and five weeks post-treatment—less at five weeks than two weeks.

In summary, Steuer remarked:

- Horses receiving anthelmintic treatment have lower pro-inflammatory responses because of lower worm burdens.
- Goblet cell hyperplasia is significantly associated with cyathostomins burden as an active response to larvae and possibly adults.

- Inflammatory response is dependent on cyathostomins present and not to the dewormer drug used.
- A notable finding is that there appears to be a spill-over effect into the systemic circulation that is strongly correlated with worm burdens. Pro-inflammatory reactions are minimal in otherwise healthy—but heavily parasitized—horses.
- Larvicidal treatment is not associated with a measurable effect on the pro-inflammatory responses. Pro-inflammatory expression is higher in untreated controls, followed by ivermectin, and lowest in moxidectin-treated horses.



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## Kester News Hour

The Kester News Hour is one of the favorite events during each year's AAEP Convention. The 2020 AAEP Virtual Convention was no different. This year's presenters during the Kester News Hour were **Regina M. Turner**, VMD, PhD, DACT, professor, section of reproduction and behavior, University of Pennsylvania, School of Veterinary Medicine; section chief, reproduction and behavior, New Bolton Center; director, frozen stallion semen program at the Hofmann Center for Reproductive Studies, University of Pennsylvania; **Katherine S. Garrett**, DVM, DACVS, shareholder, Rood & Riddle Equine Hospital; **Amy L. Johnson**, DVM, DACVIM (LAIM & Neurology), associate professor of large animal medicine and neurology, University of Pennsylvania; **Sherry A. Johnson**, DVM, MS, DACVSMR, PhD candidate, Colorado State University; and **Eric Mueller**, DVM, PhD, DACVS, director of equine programs; chief medical officer, large animal hospital; and professor of surgery, University of Georgia.

Following are summaries of some of the research and topics on which they presented at the 2020 AAEP Virtual Convention. The Kester News Hour was sponsored by Merck Animal Health.

### ***Elective Bilateral Ovariectomy***

Owners often complain about mare aggression toward other horses or generally disagreeable behavior in a mare that doesn't typically act that way. Sometimes these mares are treated with progestins; sometimes they undergo ovariectomy. A study looked at behavioral changes following elective bilateral ovariectomy [Devick, I.F.; Leise, B.S.; McCue, P.M., et al. Ovarian histopathology, pre- and post-operative endocrinological analysis and behavior alterations in 27 mares undergoing bilateral standing laparoscopic ovariectomy. *Can Vet J* 2020;61(2);181-186].

Post-op histopathology of the ovaries following removal diagnosed 33% with granulosa cell tumor (GCT) changes on

one or both ovaries despite no evidence of abnormalities of the ovaries prior to surgery. Pre-operatively, neither ultrasound nor gross inspection revealed any abnormalities; nor were there any hormone values typical of a specific undesirable behavior.

Following surgery, owner satisfaction was high, with 89% of owners noting meaningful improvement in their mares' behaviors. Mares that did not have histopathologic signs of GCT also improved with bilateral ovariectomy.

Turner presented this paper and noted that there is growing evidence that ovariectomy can make a difference in mare behavior. Considering that removal of testicles to turn a stallion

*There is no need to tease, palpate or use ultrasound to monitor ovulation when using a 29-day course of IM oxytocin to prolong CL function.*

into a gelding has profound effects on behavior, it stands to reason that ovary removal in mares might similarly modify mare behavior. That said, she stressed that ovariectomy should not be a first-line option for managing difficult mare behavior.

The study had a few limitations, as for example there were no blinded controls, no way to measure a placebo effect, and also there were varying degrees of cellular changes that one pathologist might call GCT positive while another might report the ovary as normal.

### ***Mares Behaving Badly During Estrus***

Suppression of mare behavior from estrus usually relies on the use of progestins given orally (Regumate) or as an intramuscular injection that sometimes elicits muscle soreness, or with the use

of intrauterine devices. Another technique evaluated was the use of oxytocin to extend the lifespan of the corpus luteum. In order to accomplish this treatment on a specific day post-ovulation, it usually requires veterinary involvement and expense to track progression of ovulation and the corpus luteum.

Instead, a study looked at treating nine mares with 60 IU oxytocin IM daily for 29 days without any veterinary pre-examination of the ovaries [Parkinson K.C.; Varnerwall, D.K.; Rigas, J., et al. Effect of chronic administration of oxytocin on corpus luteum function in cycling mares. *J Equine Vet Sci* 2020;90: DOI: 10.1016/j.jevs.2020.102991].

The results:

- 3/9 had luteolysis after the start of treatment, then an extended CL.
- 4/9 had a prolonged CL from the start of treatment that lasted two months, with two mares lasting 75-80 days.
- 2/9 had no effect from this treatment protocol.

In general, 78% of the mares had prolonged corpora luteal function that lasted at least 55 days compared to the control group (treated with IM saline) in which 14% experienced prolonged corpora luteal function.

In summary, there is no need to tease a mare or confirm ovulation with rectal palpation or ultrasound when using a 29-day course of IM oxytocin to prolong CL function.

Turner, who presented this research, noted that oxytocin is inexpensive. She urged practitioners not to skimp on the dose and to use a small-gauge needle for administration.

### ***Uterine Ecchymotic Treatments to Manage Post-Breeding Fluid Accumulation***

A study with nine mares susceptible to post-mating endometritis were treated over six estrous cycles. The treatments applied were a) stall confinement; b) oxytocin; or c) oxytocin and exercise at trot [Swift, L.A.; Christensen, B.W.; Samocha, M.B., et al. Randomized



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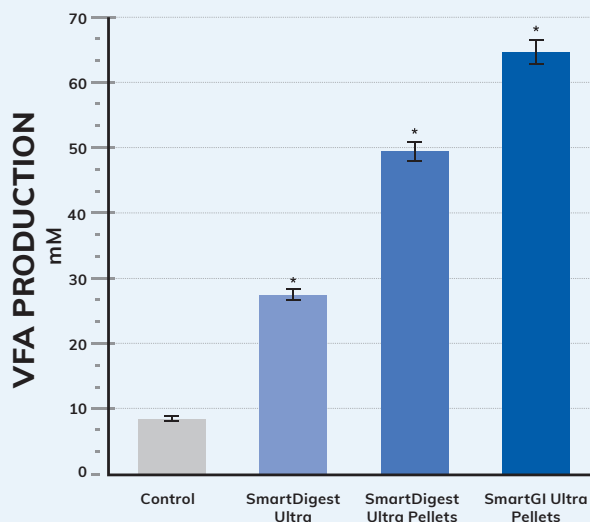
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comparative trial of acupuncture and exercise versus uterine ecbolics in the treatment of persistent post-breed-ing endometritis in mares. *J Equine Vet Sci* 2020;86: DOI: 10.1016/j.jevs.2019.102821].

Oxytocin coupled with exercise improved the ability of a mare to clear uterine fluid 30 times more than when confined to stall rest. As yet, it is unknown what the clinical significance is to pregnancy, as none of the mares in the study were bred.

An attempt to use acupuncture to stimulate uterine clearance was fruitless since four of the mares absolutely refused electro-acupuncture.

#### **Antibiotic Use and Long-Term Joint Treatment**

In a past AAEP survey, nearly half of equine practitioners reported the use of antimicrobials in intra-articular or

intrathecal injections. In most cases, amikacin was the drug of choice. However, as reported by Garrett, a study at Colorado State University found that 250 mg amikacin per joint could kill all cell types within an hour even if the media was buffered [Pezzanite, L.; Chow, L.; Soontarak, S., et al. Amikacin induces rapid dose-dependent apoptotic cell death in equine chondrocytes and synovial cells in vitro. *Equine Vet J* 2020; 52: 715–724].

In addition, studies have demonstrated that prophylactic antimicrobials in the joints do not decrease the risk of joint infections. Considering that doses of currently used amikacin harm normal joint cells, the use of prophylactic antimicrobial medications in joints might not be a sensible practice.

#### **Sidewinders/Crab Walkers**

Sidewinder and crab-walking gait abnormalities are difficult for equine practitioners to manage. The horse moves with a disjointed movement of the thoracic and pelvic limbs with a drift of the trunk, pelvis and hind limbs to one side, yet the thoracic limbs stay in a more normal position.

A retrospective study evaluated medical reports of 24 horses, mean age 19 years, with acute or subacute onset of sidewinding or crab walking [Aleman, M.; Berryhill, E.; Woolard, K., et al. Sidewinder gait in horses. *Journal of Veterinary Internal Medicine* Aug 2020].

Neurologic findings were identified in two-thirds of the cases and lameness in one-third. A poor prognosis was associated with a case fatality rate of 80%, often due to thoracolumbar spinal cord compression, equine protozoal myeloencephalitis (EPM), thrombosis of thoracic spinal cord segments, or thoracic myelopathy of unknown etiology.

Non-neurologic causes were identified as coxofemoral osteoarthritis, displaced pelvic fractures, bilateral rupture of the ligamentum capitis ossis

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femoris (n = 1), or severe myonecrosis of multiple pelvic limb muscles (n=1). Electromyography is useful to differentiate between neurologic and non-neurologic disease by evaluating effects on the electrical activity of muscle.

Johnson presented this paper and advised that if it is decided to give the horse a chance, treatment attempts should include one month in a stall plus administration of anti-inflammatory drugs and anti-protozoal drugs (if warranted).

### **Lameness and Inflammatory Airway Disease**

Administration of corticosteroids for underlying musculoskeletal disease affects performance, but it also has a potential impact on inflammatory airway disease. Up to 80% of horses in their first year of training have lower airway inflammation, according to studies.

A 35-day study of horses with severe asthma yielded some interesting results: Both intra-articular and intramuscular triamcinolone (TA) at a 40 mg total dose similarly improved lung function for up to four weeks following treatment [Bessonnat, A.; Picotte, K.; Lavoie, J.P. Intra-articular triamcinolone acetate improves lung function in horses with severe asthma. *Equine Veterinary Journal* Apr 2019].

Twenty mg of TA were injected into both tarsocrural joints of five severely asthmatic horses, or 40 mg was given intramuscularly to five severely asthmatic horses. The intra-articular form of TA had an effect on asthma for 21 days; the intramuscular effect lasted 28 days. The effects persisted when the serum concentration of corticosteroids fell below the testing threshold established by the International Association of Racing Commissioners.

While this study used a 40 mg dose of triamcinolone, more studies need to be done using 20 mg, which is a more normal dose accepted by equine practitioners when treating any ailment with triamcinolone.

### **Take-Home Message**

While the method of delivery of the information from the 2020 AAEP Virtual Convention was new, the abundance of important, put-this-to-work-in-my-practice content was up to the AAEP's usual standards of excellence.

Veterinarians who registered for the AAEP Virtual Convention can continue to watch (or re-watch) presentations on the AAEP platform until June 30. If you registered for the Virtual Convention and have problems logging in or finding information, please contact the AAEP office.

You can find additional summaries of AAEP Virtual Convention presentations and table topics on EquiManagement.com. Make sure you listen to Episode 46 of the Disease Du Jour podcast that offers summaries of several key presentations and round table discussions from the convention. **EM**



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# Acute Laminitis: A NEW APPROACH

By Derrick Cooke, CJF

ARND BRONKHORST PHOTOGRAPHY

In 2004, Dr. Chris Pollitt started sharing his research with the world. He identified two matrix metalloproteinase present during the acute phase of laminitis. This is revolutionary data, considering matrix metalloproteinase digest collagen. The dermal and epidermal lamina are held together by collagen. Another name for matrix metalloproteinase is collagenase. Pollitt determined matrix metalloproteinase 2 (MMP-2) continues to accumulate for the first 48 hours of the insult initiating the acute phase of laminitis. He also identified matrix metalloproteinase 9 (MMP-9).

In 2012, Dr. Le Wang and Dr. Samuel Black of the University of Massachusetts

shared their work discussing the effects of cleavage by a desintegrin and metalloproteinase with thrombospondin motifs-4 on gene expression and protein content of versican and aggrecan in the digital lamina of horses with starch gruel-induced laminitis. They identified MMP-1,

MMP-13 and ADAMTS-4 as being present in the extracellular matrix during the acute phase of laminitis.

Armed with this information it becomes easier to understand the nature of this disease. That understanding lead Equine Podiatry Solutions, to design a topical

Matrix Metalloproteinase	Type of Collagen Digested
MMP-1	I, II,III
MMP-2	IV
MMP-9	IV,V and extracellular matrix proteins
MMP-13	II
ADAMTS-4	All chondroitin sulfate hyaluronan-binding proteoglycans (CSPGs)

Table 1: Matrix Metalloproteinase and the collagen they digest and their impact on protein signaling



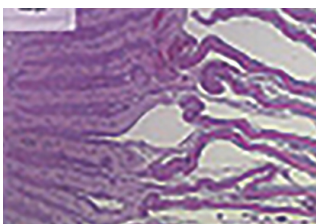
Laminitis showing rotation

ointment preventing the disease from accomplishing its devastating agenda. By synthesizing the desmosphyrin of the mitochondria we can create a superoxide dismutase preventing the oxidative stress of the matrix metalloproteinase. This will inhibit the digestion of the collagen that attaches the dermal and epidermal lamina and provides scaffolding in the extracellular matrix (see Table 1).

PHOTOS COURTESY DERRICK COOKE, DJF



**Fig 2. Healthy lamina**



**Fig 3. Lamina without support of collagen**

As one can see, the effects of these enzymes are problematic to the cells' ability to organize themselves by breaking down the extracellular matrix. The thrombospondin motif of ADAMTS-4 affects versican and aggrecan, which is vital to wnt-signaling and chondrocyte signaling. As a result the lamina become separated and necrotic. The N-Terminal of versican has an important role in maintaining the integrity of the extracellular matrix by interacting with hyaluronan. The G-1 domain of aggrecan interacts with hyaluronic acid and link proteins forming stable ternary complexes in the extracel-

lular matrix. Aggrecan plays an important role in mediating chondrocyte-chondrocyte and chondrocyte-matrix interactions through its ability to bind hyaluronan.

How can this be managed? The mitochondrial matrix contains a nuclear encoded primary antioxidant enzyme manganese superoxide dismutase that combine with fidelity proteins to combat oxidative stress. Mn(III) meso-tetrakis (N-ethylpyridinium-2-yl) porphyrin is a synthetic version of the manganese superoxide dismutase capable of preventing the matrix metalloproteinase from digesting the collagen, which protects the junctions of the dermal and epidermal lamina and the scaffolding and protein signaling provided by the extracellular matrix.

At Equine Podiatry Solutions LLC, we developed an ointment we call Desmosphyrine that is effectively protecting the bonds of the lamina in the acute phase of laminitis.

The first horse we treated was a barrel horse named Frosty.

Frosty got into the grain

bin November 4, 2016. He was taken to Brazos Valley Equine Hospital in Morgan Mill, Texas.

He presented with a strong digital pulse, crested neck, classic laminitic posture, and a solid 3 lameness on the Obel Scale. Frosty was diagnosed with acute laminitis by the attending vet. He was treated November 5, 6 and 7, 2016. Radiographs show no signs of rotation, and the horse was back under saddle December 28, 2016.

In February of 2017 Frosty placed second at the PRCA rodeo at San Angelo, Texas. In March of 2017 Frosty was eighth by thousandths of a second at The Patriot. There was no therapeutic shoeing in his treatment plan.

Figures 4 and 6 show Frosty's radiographs at intake. Figures 5 and 7 show Frosty's radiographs when he was released to return to duty.

Our clinical trials have been consistent with these results. Obviously timing is critical to success based on Pollitt's research and the interval of the accumu-

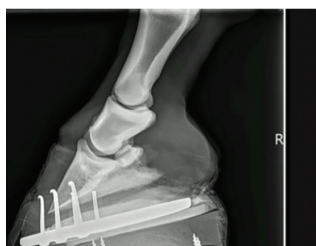
lation of MMP-2. We have found that if there is already separation, Desmosphyrine will not restore the bonds. It is only effective at preserving attached bonds.

Desmosphyrine is sold as a full treatment of 24 pre-measured applications. All four feet are treated twice daily for three days. The hair-line is shaved 1 inch above the hoof and the application of 13 cc is rubbed into the shaved area and approximately 2 inches below the coronary band. The application is active for 12 hours. This has benefit in the clinical setting because the treatment can be applied when the technicians change shifts.

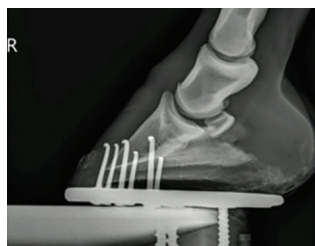
For veterinarians who are mobile or service rural areas, the client can treat the horse before he or she leaves for work and when he or she gets home.

The metalloporphyrin is pulled into the lamina by DMSO, so gloves should be worn when applying the treatment.

To order Desmosphyrine or get more information, please contact [www.beatlaminitis.com](http://www.beatlaminitis.com).



**Fig 4. Frosty's front right November 5, 2016**




**Fig 5. Frosty's front right December 28, 2016**



**Fig 6. Frosty's front left November 5, 2016**



**Fig 7. Frosty's front left December 28, 2016**



**Mindfulness can bring about an emotional transformation that can change your life.**

# Lifestyle & Wellness from the AAEP

Education for the physical, mental and emotional well-being of veterinarians was a key part of the 2020 AAEP Virtual Convention.

By Amy L. Grice, VMD, MBA

**P**hysical well-being was the focus of the AAEP Annual Convention's Lifestyle & Wellness sessions. These sessions covered utilizing ergonomics to minimize physical injuries in practice and ways to decrease the harmful effects of inflammation through mindfulness, diet and exercise.

Guy Fragala, PhD, PE, CSP, CSPHP, a retired faculty member and director of environmental health and safety at the University of Massachusetts Medical

Center, shared his expertise in ergonomics in two comprehensive presentations. Citing research on human health care workers, he described how little progress has been made in preventing back injuries in this cohort, despite years of effort.

Back pain, Fragala said, is experienced at a disabling level by nine of 10 adults at least once in their lives. While mathematical formulas can determine the safe amount of weight that can be lifted in various body positions, rarely has this information decreased injuries.

Ergonomics research has helped to identify risk factors for all types of musculoskeletal injuries in the workplace. Fragala stated that 27% of workers' compensation claims for veterinarians involved musculoskeletal injury.

Risk factors for musculoskeletal injuries include repetitive movements, awkward postures, lifting and vibration. When these factors occur in combination, he said, injuries sharply increase. Work-related injuries can include repetitive strain injuries, repetitive

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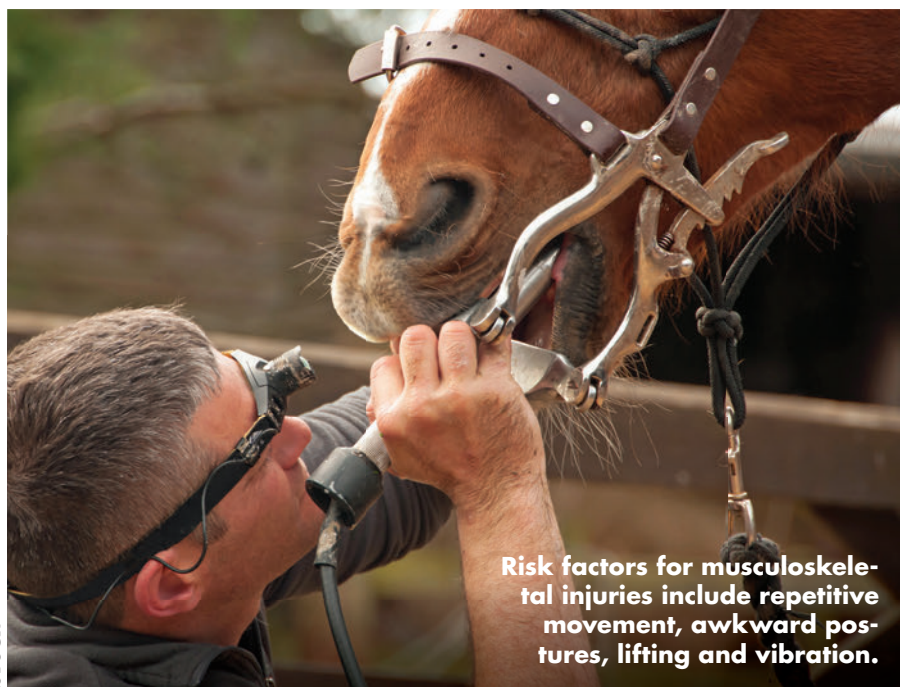
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**Risk factors for musculoskeletal injuries include repetitive movement, awkward postures, lifting and vibration.**

motion injuries, cumulative trauma disorders and occupational overuse syndrome. These injuries, according to Fragala, can involve tendons (e.g., tenosynovitis, bursitis), as well as nerves (e.g., carpal tunnel syndrome, Reynaud's syndrome).

The speaker explained that cumulative trauma disorders are musculoskeletal conditions that develop gradually over a period of time and do not occur after a single acute event. Nonetheless, they can cause significant damage by repetitive wear and tear on tendons, muscles, related nerves and bones, he said.

The cumulative trauma cycle begins with micro-trauma to tissue that results in scar tissue and adhesions that coalesce. The resulting decrease in flexibility, strength and function results in ongoing inflammation in a never-ending cycle, especially when the inciting activity continues. Musculoskeletal disorders can cause decreased range of motion, decreased grip strength and loss of muscle function, he added. The patient might experience pain, numbness, tingling, burning, cramping or stiffness.

Utilizing an array of photographs of equine veterinarians performing

various job functions, Fragala pointed out the risk factors for musculoskeletal injuries that were being demonstrated by the doctors pictured. These included awkward posture, static loading, sustained exertion, force, vibration, multiple repetitions of a particular motion, insufficient rest periods and psychosocial stress. Of these, he called out posture, force and repetition as the most important.

Posture can be static or dynamic, the speaker explained. In static posture, the body and its segments are aligned and maintained in certain postures. A dynamic posture, by contrast, refers to postures where the body or its segments are moving. Hand and wrist posture in equine veterinary work often contribute to chronic injury, he said. While static postures lead to lowered blood flow, overload and fatigue, dynamic postures allow for normal blood flow.

Bending postures increase the risk of injury substantially, he stated, especially if the time is lengthy. Other risky postures are twisting, reaching behind or in front of you with arms outstretched, and working with your arms, hands or elbows above your shoulders. Kneeling,

squatting and bending the trunk are among the most traumatic of postures, he noted, especially when combined with stretching the arms forward.

Addressing physical fitness, rest and good nutrition are among the most important general preventions for musculoskeletal injuries, Fragala continued. However, in studies of how to prevent back injuries, many approaches have been tried, including teaching patients about the anatomy of the back and spine, teaching the importance of fitness and nutrition, counseling about stress reduction, and introducing ergonomics and redesigning jobs. Of these four methods, the only one that was modestly successful was ergonomics. It is difficult to modify behaviors when there is minimal follow-up, he said, and theoretical principles can be hard to implement in the workplace.

"Ergonomics" is defined as the science of arranging and adjusting the work environment to fit the employee's body. Because equine veterinary medicine is one of the most dangerous civilian occupations, according to the 2014 BEVA study, applying ergonomics is important, he said. This study reported that over a 30-year career, an equine veterinarian could expect to incur seven to eight work-related injuries that limited the ability of the professional to work. Dental, obstetrical and lameness procedures were those most frequently cited by respondents, he said.

The practice of equine veterinary medicine includes awkward postures; high hand force; highly repetitive motions; repeated impact; heavy, frequent and awkward lifting; and moderate-to-high hand and arm vibration with use of motorized dental and surgery equipment. In addition, equine patients are large and unpredictable, the speaker said. All of these combine to create a high potential for work-related injury.

Some ideas offered by Fragala to mitigate the risks included using a stool for low positions to eliminate squatting,

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

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

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

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

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

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

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

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

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

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

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

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

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

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

**See Product Insert for complete Adverse Reaction information.**

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

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

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

**Refer to the Product Insert for complete Effectiveness information.**

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

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

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

**Manufactured for:**  
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To report adverse reactions contact Dechra Veterinary Products at: 866-933-2472.

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MILTON C. TOBY

## A veterinarian should consider ergonomics in all aspects of his or her day to improve health.

kneeling or bending; using an adjustable equine head support during dental procedures rather than relying on an assistant to hold up the head; assuring proper table height in surgery; and improving posture, force and repetition in rectal palpation, if possible.

The speaker reminded vets to pay attention to signs that they are developing repetitive strain injuries so they can attempt to minimize permanent injury. By having awareness of the risk factors and attempting to mitigate them, veterinarians might be able to reduce their musculoskeletal damage and chronic pain.

## ‘Inflammation Nation’

Floyd “Ski” Chilton, PhD, a professor in Nutritional Sciences and the director of the Precision Nutrition and Wellness Initiative at the University of Arizona, gave a presentation entitled “Escape from Inflammation Nation.” With personal stories of his own

journey and anecdotes from people who have improved their lives through his initiatives, Chilton illustrated the importance of mindfulness and spiritual awakening in achieving health and wellness.

The speaker discussed dual process reasoning, comparing the unconscious brain (which he called System I) and the conscious brain (termed System II). He explained that System I operates in the primitive, “reptilian” areas of the brain and acts swiftly and unconsciously, recognizing and responding to danger and perceived threats with fear and action. This part of the brain, he said, triggers emotions, impulses, creativity and competition. It can often perceive things inaccurately.

By contrast, System II resides in the frontal cortex, is slow to arouse and act, and is the home of the conscious self. This conscious part of the brain deliberates, calculates and analyzes. It makes slow decisions utilizing executive functioning, he stated.

When unconscious systems are in overdrive through childhood trauma, previous terrifying events or other issues, it will cause relationships to suffer and happiness will be elusive. “If you constantly need to be in control,” he said, “you are operating in System I.”

Chilton explained that primarily operating in System II can be achieved through three steps: experiencing your pain, surrendering to a higher power, and trusting in the future. When you become aware of painful emotions, you can use this technique to concentrate on physically feeling your psychic pain and accepting it. Then, by letting it go, you no longer carry that burden, allowing yourself to feel calm and open to the future, he explained.

Chilton also spoke about the connection of inflammation to obesity. He noted that inflammatory diseases such as arthritis, asthma, cancer, diabetes, heart disease, stroke and Alzheimer’s Disease are associated with obesity. To

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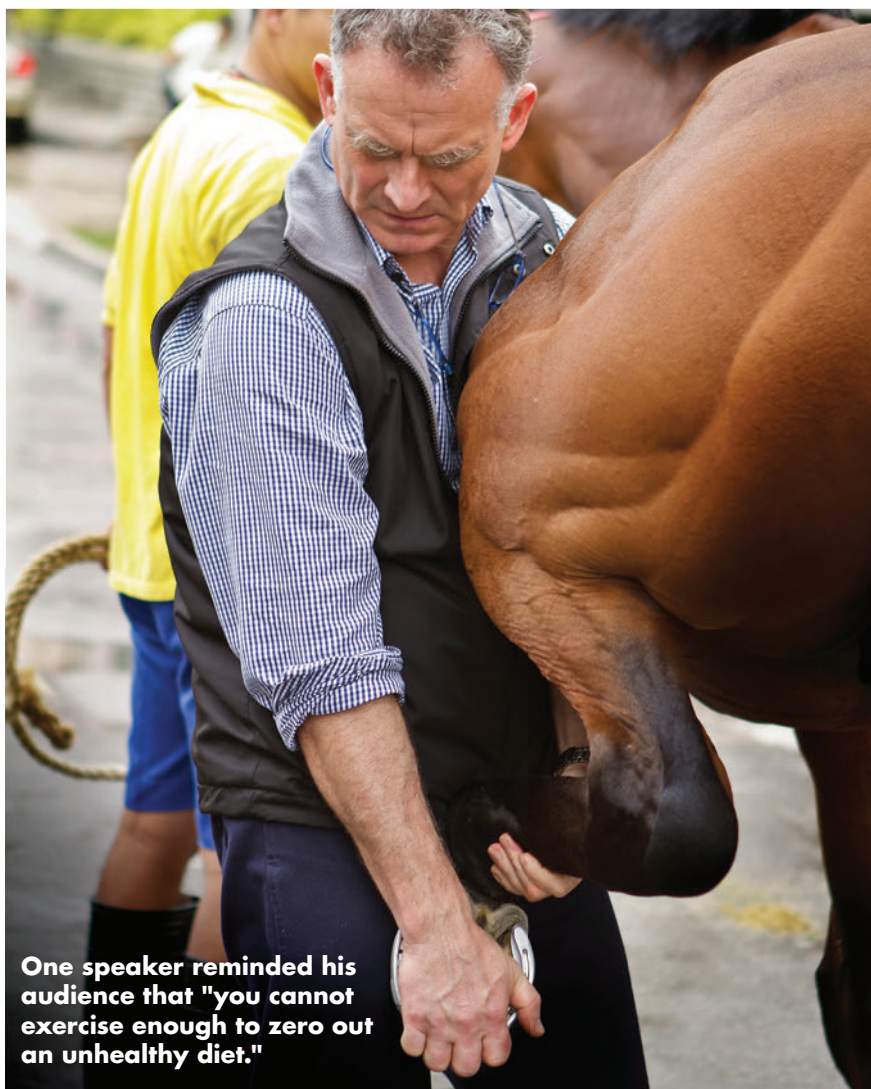
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**One speaker reminded his audience that "you cannot exercise enough to zero out an unhealthy diet."**

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break the cycle, the speaker recommended four steps: break the food addiction cycle, be intentional with food, be intentional with exercise and choose good nutritional strategies.

The speaker said that addictive foods include fat, sugar, salt and processed food. His recommendation for breaking free was to be very intentional about your eating, understanding the calories you are consuming and calories you are burning, and understanding that "you cannot exercise enough to zero out an unhealthy diet."

For dietary health, the speaker recommended following a Mediterranean diet, avoiding processed foods, increasing protein, reducing simple carbohydrates, increasing complex carbs and fiber, increasing polyphenols

(e.g., blueberries and red wine), and increasing omega-3 fatty acids.

Exercise has many positive effects, Chilton stated. They include increasing life span, muscle mass and bone density; decreasing depression, anxiety and inflammation; improving blood pressure and cognition; preventing chronic disease; and stabilizing blood sugar. Research shows that exercise dramatically slows aging, he added.

## Take-Home Message

Mindfulness can bring about an emotional transformation that can change your life to a more joyful, peaceful existence, while careful attention to your weight, diet and exercise regime can add years to your life and improve your health substantially. **EM**



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# Five Tips to Engage Clients in Equine Wellness Care

By Amy L. Grice, VMD, MBA

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Veterinarians often tell me that when clients use their practitioners' full complement of wellness care for their horses, emergencies are few. Anything that can reduce emergency calls will improve the lives of veterinarians, horses and their owners.

Horse owners regularly confirm in surveys that their veterinarians are their most trusted sources of information about vaccinations and other wellness care. The 2017 AVMA Pet Owner Demographic survey showed that 89% of respondents considered their horses to be pets or family members. This provides a huge opportunity to educate horse owners about the best ways to protect the animals that they love.

Here are five tips for encouraging clients to embrace wellness care, including vaccinations provided by a veterinarian:

1. Have a **Wellness Wednesday** post on your practice Facebook page every week. Highlight a disease that is a concern in your region. Engage your clients in telling their stories, or tell a "happy ending" story from your practice—with the owner's permission, of course. One week you could have a "Name This Disease" post with common clinical signs, asking your clients to post their thoughts on what was causing the illness. Another week you could post a graphic of the complex life cycle of transmission. The next week you could detail treatment (if available for that disease). And another

week you could focus on preventative management steps. With each of these posts, you should be sure to have a simple sentence referencing the availability of a vaccine to prevent or minimize disease.

2. Hold a **virtual or in-person event** for your clients on "Keeping Your Horse Healthy with Wellness Care." Outline the benefits of vaccination, dentistry and an annual physical exam. If you have a story about a patient with each disease that vaccines can prevent or minimize, you will engage your audience exponentially compared to a dry recitation of facts. Project a picture of a horse with the disease as you tell your story. Hearing about your experiences will build a sense of importance and urgency about preventing diseases.

3. **Create a template** for the needed vaccines in your region, taking into account different horses' lifestyles and management. An eye-catching chart that is simple and concise can be posted as a photo on your Facebook page or e-mailed to your clients to help them make decisions about their horses' needs. Encourage them to contact you with questions.

4. Develop a **wellness plan** that incorporates needed vaccinations, dentistry and a physical exam. You can create a reward for participating in such a plan. Examples of rewards can include small discounts on a bundle of wellness services, an emergency kit (\$50-\$100 value), or creation of a digital owner's medical record with photos and a medical history that can be updated.

5. Consider **raising your emergency fees**; then you can give patients that have received wellness care within the last 12 months a *noticeable* discount on those fees if an emergency occurs.

No doubt you or your staff can come up with even more innovative ideas!

With these strategies, you can encourage your clients to continue calling you for their horses' primary care and vaccination needs. **EM**



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# AAEP Convention Business Topics

There were many opportunities to gain information and have discussions about business topics at the 2020 AAEP Convention.

By Amy L. Grice, VMD, MBA

**D**ue to the pandemic, the 66th Annual Convention of the AAEP was held virtually. With the presentations available on demand, many members were pleased that they did not have to choose between sessions held simultaneously.

Table Topic attendance was higher than ever, with robust and meaningful discussions on the Zoom platform in those sessions. Some of the Business of Practice presentations complemented

the Table Topics, while others brought a comprehensive treatment of other critical topics. Note that all of the convention recordings are available to registered attendees until June 30, 2021. If you missed any of these topics, you can go back and watch them on-demand.

## Cooperative Emergency Coverage

Drs. Amanda McCleery and Racquel Lindroth facilitated a well-attended Table Topic called "Answering the Call:

Providing Equine Emergency Coverage through Cooperative Efforts." Both of these professionals had been instrumental in setting up such cooperatives to share emergency duty among local colleagues in their respective practice regions. They each shared their experiences and the basic structure of the groups.

McCleery's emergency cooperative has five veterinarians, some of whom do solely equine work and some who serve all large animals. This was daunting to some of the members, she reported, so at

the group's monthly meetings, education on common emergencies of ruminants and camelids are periodically presented. In addition, these monthly meetings also are utilized as a journal club and for networking and support.

Each of the five members provides emergency service on one regular weekday overnight each week and one weekend per five weeks. The expectation for communication includes an update and sharing of the medical record to the primary care doctor for every patient seen by the morning following the emergency. This follow-up can be by text, email or phone call.

Because her emergency duty occurs so seldom, and is always busy, McCleery hires her technician to be on call and attend emergencies with her, making her much more efficient. In 2018, the emergency coalition took care of all urgent and emergency visits for McCleery's clients while she was out on maternity leave.

Lindroth created a coalition of five equine practices 12 years ago when she was practicing in Colorado. The practices all shared a common vision, were experienced, responsible and communicated well, she said. Although initially she worried about loss of clients and a negative financial impact, she found that her quality of life improved dramatically, her relationships with colleagues were enhanced, and her client base grew.

A live poll of the attendees during the session asked what the top concerns about establishing an emergency coalition were. The results indicated that client acceptance and excellent patient care were the top concerns.

## Sole vs. Corporate vs. LLC Practice

"Sole Proprietorship vs. Corporation vs. LLC" was a popular Table Topic hosted by Drs. Martha Mallicote and Andy Clark. They led off the discussion by defining the different business entity types and said, "If you haven't created a

formal business structure, you are a sole proprietor by default." The negatives of this structure are the liability risk for all your personal assets, the need to pay taxes on all profits, and the difficulty in raising capital, they said.

An LLC (limited liability company) is a more flexible entity than a corporation, Clark said. Recordkeeping in most states is less complex with an LLC. You can elect to have profits taxed either as an S-Corp or as a sole proprietor, and the owners' assets are shielded for business liabilities. He said 90% of



**Responding to clients' emergencies can be a stressful part of equine practice.**

veterinary practices are set up as LLC businesses.

Corporations have much more complex recordkeeping, Clark noted. An S-Corp is taxed only once on profit and is limited to 100 shareholders, all of whom have voting rights.

A C-Corp is taxed twice, once at the corporate level and once on the shareholder income. This type of business can have common and preferred shares with different voting rights.

In some states, Professional Corporations and Professional Service Corporations are available business entities.

Questions and discussion centered on the corporate aggregation of practices, the business entity form most attractive for bigger practices, and the importance of a buy-sell agreement and partnership agreement in multi-owner practices.

## Student Debt Management

Drs. Tony Bartels and Joe Pluhar led a comprehensive Table Topic on "Student Debt Management" that began with both telling their stories of managing their personal educational debt.

To illustrate the differences in risk tolerance, Pluhar used this example: "Some people buy horses with bad front feet but won't buy a sore-backed horse. It's the same with managing money."

Some excellent advice emerged during the session, including a reminder that during this time of 0% interest on federal loans, maintaining your payments can reduce your principal balance markedly.

Bartels thought that the interest moratorium might be extended by the new administration into 2021. (*Editor's note: Check out EquiManagement's The Business of Practice podcast with Marsha Heinke, DVM, CPA, on "Pandemic Relief for Veterinarians" that was released on January 19.*) In addition, he recommended investing money in a robo-advisor investment account to save for future forgiveness taxes if you have undertaken an income-based repayment program. In this type of account, you choose your risk tolerance, and your investments are set up automatically.

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

Because stock market values have expanded so dramatically in the last year, many investors have seen large increases in their equity accounts.

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

your debt forgiveness.

Bartels explained that VIN (Veterinary Information Network) has a simulation program to help people decide the best way to proceed in paying their educational debt and to determine the least costly option. This is found at [www.vin.com/studentdebtcenter](http://www.vin.com/studentdebtcenter).

It is his opinion that the Pay As You Earn Repayment Plan (PAYE Plan) for a 20-year term might be the best plan for most veterinarians, but you must then invest monthly to earn enough to pay the eventual tax on the forgiven amount. The most important calculation is the total cost of the loan, the facilitators said.

## Loan Repayment

Dr. Martha Mallicote presented an on-demand presentation entitled “Loan Repayment: Programs and Strategies for Equine Vets.” In this comprehensive review of managing educational debt, the speaker reviewed the basics of organizing loans and determining the best repayment strategies.

The first step, she said, was identifying all of the outstanding loans, the loan servicer, any grace period and the interest rate—then determining what monthly payment amount will be possible after graduation, after consideration of your compensation. Utilization of a repayment calculator to assess a repayment strategy is smart, she said. In addition, applying for whichever repayment program you choose must be done several months in advance of the end of your grace period. She recommended choosing automatically deducted payments, which might reduce the interest rate by 0.25%, which can add up quickly.

Loans in repayment or the grace period are eligible for consolidation, Mallicote noted, and although not all types of loans are eligible, most federal loans are. Repayment plans, she explained, can be standard fixed plans or income-driven.

There are a variety of income-driven plans, and a borrower must be careful to understand the specifics of each type.

Most importantly, borrowers must plan for the income tax that will come due on any amount that is forgiven in the year the repayment ceases. This can be a large sum all due in a single year, she warned. By carefully analyzing repayment strategies, graduates can plan their approach to this financial challenge.

## Mentoring New Grads

“Mentoring New Grads and Introducing Them to a New Practice” was a well-attended Table Topic facilitated by Drs. Kim Harmon and Luke Bass. The facili-



tators began with a well-prepared summary of what each finds most important in the first six-month period of a new graduate's time in practice. Setting up expectations, teaching the communication style used with the practice's clients, having the new graduate commit to his or her goals in writing, selecting cases carefully for the new team member, giving consistent feedback, and having structured learning available on slow days were all listed. The session leaders emphasized that when giving feedback, “every word matters” and that giving encouragement and focusing on “why” are important.

In the second half of the first year in practice, Bass and Harmon suggested

asking a new graduate who is struggling, “How can I help you?” and “What do you need?” rather than making assumptions or jumping in.

Mentors can also help the mentee with the planning of next career steps and finding an area of passion in practice. When performance evaluations are given, it was suggested to ask the associate or intern how he or she likes to receive feedback and have that person do a self-evaluation. The meeting to discuss the results should be non-confrontational, with an effort to identify strengths and weaknesses, and ask “What can you learn from your failures?”

A discussion of the need for an equine internship followed an attendee's question. Both facilitators felt that very few students are ready to enter equine practice after graduation because of limited opportunities for hands-on skill acquisition. The fact that horse clients have often witnessed commonly provided services multiple times by other veterinarians means they will be quick to notice hesitation or lack of a skilled technique. This can cause a lack of trust, which can spread rapidly by word of mouth from client to client.

“If they want to work at a high-level equine practice, they should do an internship,” one participant said.

The beauty of a great internship is the ability to learn a wide variety of skills with the help of a mentor and without the judgment of clients, the presenters concluded.

## New Graduate Expectations

Drs. Liz Arbittier and Michelle Bessire hosted the Table Topic called “What to Expect as a New Graduate.” Referencing the 2016 AVMA AAEP Equine Economic Impact Study results, they shared that more than 90% of respondents to the study expected new graduates to be able to diagnose and treat a foot abscess and repair simple lacerations. In addi-

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tion, more than 85% expected competency in working up a colic in the field, performing an ophthalmic exam and diagnosing an uncomplicated lameness with common nerve blocks.

They pointed out that practitioners with greater than 20 years' practice experience had different expectations than those with less than 20 years' experience.

The soft skills found to be most important in the survey were communication and people skills, the presenters added.

Other knowledge that the session leaders felt was important for new graduates included antibiotic stewardship, quality of life issues related to euthanasia, neonatal medicines and strategies for dealing with dangerous or unruly horses.

Practice owners attending the Table Topic listed as most important knowing when to call for help, when to say "I don't know" and how to work up cases on a budget.

They also valued new graduates who have the interpersonal skills to work with office staff harmoniously.

## Setting Fees

Drs. Monty McInturff and Jim Zelif led a popular Table Topic entitled "How to Set Fees." The opening advice that the session leaders gave regarding fees was to "pay off high educational debt by being productive and profitable" and to "always value yourself."

Because margins are shrinking on medications, service fees must increase as costs increase, said Zelif.

In response to a question about how to keep associates paid well enough that

they stay at a practice, McInturff suggested that services be valued properly and priced accordingly. In order to set fees, he suggested that practice owners ask themselves: "Do you know your price point in the market? How do you choose your fees? How often do you increase your prices?"

To assist equine practitioners in making good decisions about their practice fees, results from a fee survey were made available for download, with the mean, median, high and low fees for a wide variety of services listed. This resource will be of significant assistance to many practitioners and is available

their fetuses/infants. Instead, undertaking negotiations and standing firm on reasonable demands are essential.

Two related Business Session presentations by Dr. Amy Grice outlined "Staying Safe and Comfortable in Practice During Pregnancy" and "Veterinary-Specific Risks in Practice for Pregnant Women."

One important take-home point was the requirement for practice policies on disability leave to be inclusive of pregnant women. This means if an employee is injured or otherwise unable to work for a medical cause other than pregnancy and is given time away from

work with his or her job held open for a period of time, the same treatment must be afforded a pregnant employee. Pregnancy and delivery disability is generally considered to be six weeks for a vaginal birth and eight weeks for a C-section delivery. If an employee who broke his or her leg was allowed to have six weeks off to heal, it is

unlawful to not allow the same for the pregnant employee.

Another key fact shared by Grice was the need to be especially careful with radiation exposure of the fetus during the first eight weeks of gestation. The most dangerous time for radiation exposure is following conception (pre-implantation) up to the eighth week of pregnancy, she said. Radiation exposure during your entire gestation should not exceed 500 mrem. Because many women might not know they are pregnant that early, it is important to regularly review the reports from your dosimeter badge to ensure that your equipment and radiation safety techniques are protecting you



ISTOCK/LITTLE CITY LIFESTYLE PHOTOGRAPHY

**If you are hiring a new graduate, do you know what you expect him/her to be capable of doing?**

on-demand on that Table Topic page for those who registered for the 2020 AAEP Convention.

## Pregnancy in Practice

A Table Topic called "Pregnancy in Practice," facilitated by Drs. Laura Javiskas and Sarah Cohen, addressed the many challenges of working while pregnant and navigating maternity leave. Themes for the conversation were the importance of collaboration, use of emergency coalitions and transparency.

Those in attendance were reminded that they have power, should know the laws, and should not make decisions that compromise their health or that of

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**Veterinarians who are pregnant should know the laws concerning job security.**

from excessive exposure, she advised.

In addition, Grice stated that a number of agents used in veterinary medicine are harmful, including waste anesthetic gases, polymethyl methacrylate, diethylstilbestrol (DES), chloramphenicol, misoprostol, cyclosporine, altrenogest (ReguMate) and dinoprost tromethamine (Lutalyse). In addition, there is danger in exposure to chemotherapy, formalin, toxoplasmosis and a host of other zoonotic diseases.

In conclusion, she recommended that veterinarians educate themselves about the specific risks in their workplaces.

### **Corporate and Legal Matters**

Dr. Charlotte Lacroix gave a series of presentations in the session “Navigating Important Corporate and Legal Matters,” speaking about corporate practice sales, negotiating contracts, employee performance coaching and the legal issues with marijuana.

The speaker gave a comprehensive

explanation of the landscape of corporate acquisitions in “What You Should Know About Corporate Practice Sales.” She explained that corporate investors appreciate veterinary practices because the veterinary industry has continued to grow and remain profitable, even through multiple recessions. There are also cost savings realized from shared infrastructure once 50 practices are consolidated.

Practice owners are likely to receive a higher price from a corporate consolidator than from an associate or “inside” buyer, and the sale is likely to be completed much faster, she stated.

For veterinarians who prefer to simply practice medicine rather than manage a practice, selling all or part of the business and remaining as a team member can be attractive. Sometimes the capital available to purchase new equipment or revamp a facility is the top advantage. In equine practice, practice owners might be ready to retire, but they have

not identified an associate or group of associates to purchase the business, she added. Disadvantages to a corporate buyer center on the impacts to clients, staff and associate veterinarians. It can be difficult to navigate a smooth transition. Change is always hard, and some employees might not stay.

### **Contract Issues**

In her talk on “Issues to Negotiate in Contracts Seen in Practice,” LaCroix explained the different types of bargaining (distributive and integrative), negotiation styles (competing, avoiding, collaborating, accommodating and compromising) and tips for negotiations.

She stated that many people fear negotiations because they might not have a solid position yet or they fear looking foolish or making mistakes. In addition, they might want others to like them and not view them negatively or they might be averse to conflict, feel vulnerable, and/or be uncomfortable with money.

For best results, she recommended determining the other party's interests, embracing compromise, being fair and reasonable, and being prepared.

## Client Surveys

Dr. Mike Pownall spoke about the use of client surveys in his talk "Use of the Net Promoter Score Survey to Improve Business Growth, Profitability and Client Loyalty."

The basic idea of the Net Promoter Score (NPS) is that only one question is needed to determine client loyalty: "How likely is it that you would recommend this practice/business/product/service to a friend or colleague?" he explained.

The NPS is measured with a response of 0 to 10, with 0 being "not very likely" and 10 being "very likely." When looking at results, three categories arise: Promoters, Passives and Detractors. Promoters, Pownall said, give a score of 9 or 10 and exhibit the behaviors of a very loyal client. Passives give a score of 7 or 8 and are ambivalent. Detractors score with a 0-6 and might be actively giving poor reviews, arguing over prices and seeking a new provider.

By adding an open-ended question asking why the respondent answered the way he or she did, a company can glean a great deal of helpful information that can help the practice provide better service, he noted.

In the speaker's practice, use of the NPS has been ongoing for more than 10 years. Receiving high scores on the NPS indicates a high level of loyalty from clients and generally means that profits will be sustainable and robust, even in the face of an economic downturn or increased competition, he stated. This can provide confidence and comfort during uncertain times.

## Hospital Design for Controlling Infectious Disease

The presentation "Review of Hospital Design Techniques for Controlling

Infectious Disease" by Dr. Lucas Pantheon and architect Heather Lewis, AIA, NCARB, was a thorough and exacting treatment of this very important topic. By understanding the three major modes of transmission of disease—fomite, oral and aerosol—architects can design veterinary facilities that minimize nosocomial infections, Pantheon explained. During the pandemic, humans are at risk from contact with each other, with distancing and handwashing being critical. (*Editor's note: Check out EquiManagement's The Business of Practice podcast on "Creating Healthier Practice Spaces" with Lewis, which was published on March 16.*)

*Check out EquiManagement's The Business of Practice podcast on "Creating Healthier Practice Spaces" for more information on this topic.*

For eliminating fomites, cleaning surfaces and handwashing are essential. Handwashing only happens when sinks are readily available in multiple locations, Lewis said. She recommended touchless sinks as the best option. Consideration of the flow of people and patients through the facility is also needed, with a special emphasis on the flow of "dirty" patients, equipment and supplies. As an example, she said that in laundry management, it helps to have color-coded laundry baskets to separate dirty from clean. The same thought must go into the flow of surgical instruments and other equipment.

To prevent fecal-oral transmission, floors must be sealed and surfaces must be easily cleaned and disinfected without the capacity for harboring

pathogens. Hose bibs hung high will keep hoses from being dragged from clean into dirty areas and back, Lewis noted. She prefers poured urethane and seamless joints for floors, and said that carpet is the worst choice for office areas due to its high absorption of soil.

The best strategies for reducing airborne transmission include separate tools and equipment for each stall in an isolation unit, using physical distancing of patients, installing exhaust systems and using lots of natural air flow.

In order to accomplish these objectives, facilities must be built with multiple sinks and hose bibs, and with a sharp eye to containing disease through smart design choices. Veterinarians familiar with biosecurity should work with architects to achieve these goals, the speakers concluded.

## Practice Financial Health

Marsha Heinke, DVM, CPA, a well-known veterinarian accountant, gave two presentations focused on utilizing data to create practice financial health.

In the first, "Healthy Practice Measures for Solo and Multi-Doctor Practices," Heinke compared the importance of aggregated data (benchmarks) and a particular practice's data, noting that following the trends within your practice is most useful. However, reliable, accurate and consistent data is required, she added. By using accurate accounting nomenclature, clear communication with accounting professionals becomes easier, and the use of graphical representation of financial data can increase understanding within practices, she explained.

The methodic collection of data with accurate recording, followed by data sorting and timely summarization, requires trained staff. That can be simplified by adhering to a system of data collection by utilizing a detailed chart of accounts; making sure the practice has determined its mission, vision and values; avoiding analysis paralysis; be-

coming familiar with benchmarks; and making connections between “x” and “o” data.

“X” data is experiential data that arises from emotions and experiences. Heinke said “x” data can be numerically measured through methods such as the Net Promoter Score (covered above by Pownall).

“O” data is operational and flows from various financial analyses of practice performance. Key Performance Indicators (KPI) are “bird’s-eye metrics that allow us to understand what’s going on in our practice,” she said. They are specifically chosen for goal accountability. Examples are profitability, cash flow, revenue, client growth and retention.

Heinke discussed the difference between EBITDA and operating profit, explaining that adjustments for closely held businesses are necessary. These adjustments include normalizing owner compensation, lease of real estate, extraordinary one-time expenses, earned interest and other non-operational income. She also explained that the type of business entity of a practice will change the tax strategy, and it is important to note the difference between tax strategies and management strategies.

Because practices with high debt might have poor cash flow, Heinke suggested utilizing the cash flow statement to track where the money goes. This is the financial statement where one can see payments on debts such as loans or leases, as well as distributions of profit to owners. She also recommended utilizing two to three years’ worth of profit and loss statements to create an annual budget in a spreadsheet format in order to be able to perform some “what if” analyses.

In addition, by performing a break-even analysis, one can create a daily target for gross revenues, using the assumption that variable costs tend to increase at the same percentage rate as revenues do.

Another analysis she recommended

was client growth and retention. By quantifying the number of new clients and those still present after two years, one can get a sense of the bond the clients have to the practice. Loyalty is known to increase profitability. “All analysis should support profitability,” she said in closing, suggesting that practice owners look for trouble spots in real-time rather than with lagging indicators.

“Strategies for Improving Practice Financial Health Using KPIs,” Heinke’s second presentation, continued the theme of using “in-house” data to drive improvement.

Because equine practice benchmarks

*Practice owners should look for business trouble spots in real time rather than with lagging indicators, recommended Marsha Heinke, DVM, CPA.*

are often based on scant data, and those practices can be very different in market and scope, KPIs are often a better choice for gauging achievement, she said. In addition, she emphasized the importance of starting with the essential principles in practice health, namely a defined business purpose and strategy; written mission, vision and values; strong ethics; and risk mitigation of legal and regulatory vulnerabilities. Once these are in place, timely data collection can be actionable.

Heinke then discussed the Balanced Scorecard developed in the 1990s and published by Kaplan and Norton in the *Harvard Business Review*. This model organizes a business into four equally important themes. Each focused area is defined by crucial success factors that

are measurable and can be the basis for actionable KPI. She subsequently modified the model for veterinary practices, calling it the Veterinary Practice Scorecard (VPS).


The four foci in the VPS are the patient/internal processes perspective, the client perspective, the employee engagement perspective and the financial perspective, she said. By stating objectives for each aspect and determining metrics to measure and incentivize progress, goals can be more readily attained.

Heinke suggested creating spreadsheet KPI models that are updated monthly and include a trailing 12-month total. This trend line is useful for recognizing positive or negative trends quickly so they can be rapidly addressed.

There are many available business intelligence applications built on the Balanced Scorecard model. Although they might be more complex than most practices need, they are available in the marketplace. However, one can create effective data analysis tools in Excel that will give good intelligence about the practice performance.

In closing, Heinke reminded the audience that successful use of KPIs for practice improvement requires consistency, dedication and effective decisions with thoughtful change management. By having clear strategic objectives and appropriately focused KPIs, a practice can make improvements in performance with management changes based on facts, she concluded.

## Why Vets Are Leaving Equine Practice

“Why Veterinarians are Leaving Equine Practice” was presented by Grice. Utilizing a survey of practitioners posted on various Facebook veterinary sites, reasons for considering leaving and actually leaving equine practice were explored. This survey was previously published in *EquiManagement* and can be found online at [equimanagement.com/articles/leaving-equine-veterinary-practice](http://equimanagement.com/articles/leaving-equine-veterinary-practice). 



# Low-Cost, High-Value Materials

There are ways to save money and still use quality materials to build or update your veterinary facilities.

By Heather E. Lewis, AIA, NCARB  
Photos courtesy of Animal Arts

**S**mall businesses such as equine veterinary practices have been hit hard by the SARS-CoV-2 global pandemic, both directly (having to modify operational practices) and indirectly (harder to get goods and services).

If you are trying to build or improve your clinic right now, you might be facing more difficulty with hiring professional services, and you might be feeling the effects of slowed supplies. For example, in the Atlanta area of Georgia, lumber prices have recently risen by about 30% because of disruptions in supply chains.



**Use higher-quality materials in areas where clients will notice.**

If you are building, build smarter. Fortunately, architecture firms slogged through the last recession recently enough to be able to resurrect many strategies for getting more value for your dollar. In this article, I will share our frequently employed strategies for selecting low-cost, high-value materials, finishes and systems for the equine veterinary space.

## General Strategies

***Build only what you need to build.*** In previous years, I might have advised you to “build for the future.” Unfortunately, because this is not a perfect time to build, I recommend in 2021



that you build for what you truly need. For example, if you are building a haul-in clinic with the possibility of future surgery, hold off on building out the surgery suite right now. You will likely not have extra room in your budget, and it is more important to make money right now than to spend it.

**Keep the footprint compact and simple.** Rectangular buildings cost a lot less than ones that are irregularly shaped, because every corner and transition costs money. Plan to simplify your building shape as much as you can. Use a single roof style, a compact shape, and disturb as little of your site as possible. This will help keep your costs in check.

**Use the most affordable building construction systems.** While I am not always a fan of prefabricated “metal” buildings, this is a good time to use them. These buildings are lightweight and have simple framing systems, so they are inexpensive. Because they’re too lightweight in some areas, such as treatment rooms and knock-down stalls, you might need to build some concrete block walls inside the shell of the build-



### **Hospital-appropriate HVAC systems can be very expensive.**

ing in areas where you require durability. This mixing of materials and systems might seem complicated, but you will still gain overall cost savings by building within a simple structural form.

### **Put the Money Where It Counts**

When working toward an overall cost-saving strategy for a building design, it is acceptable and even encouraged to use different materials and a different quality of construction in different portions of the building. In

an equine clinic, I put money into the equine medical spaces, where durability and safety are of utmost importance. However, the offices and support areas can be stripped down to their basics. For example, it is acceptable to purchase cabinets for your offices from Ikea and select different, more durable cabinets for the medical spaces that get used harder and cleaned more rigorously.

For spaces where aesthetics do not matter, go as cheap as possible. For example, your central supply room might need nothing more than a concrete floor, some storage racks and overhead strip lighting.

I like to use higher-quality materials in a few areas where they will be noticed by your clients. An example is the reception desk. For the reception desk surface, it is a great investment to spring for an expensive quartz countertop, as this surface will be touched by all clients every time they visit. Another good example is the client restroom. A few nice decorative tiles in this restroom will go a long way toward making the overall space feel fancier than it is.



**Prefabricated metal buildings are less expensive but might require some modifications.**

## Use Flexible HVAC Systems

One place where money is spent in the greatest quantity is in hospital-appropriate HVAC systems. For equine hospitals, one strategy we can use is to minimize these higher-quality systems to the surgery areas and critical spaces, and to design other spaces—such as exam and treatment rooms—as indoor/outdoor. In nice weather, doors can open to the outside, and these semi-outdoor spaces can naturally ventilate.

In poor weather, these spaces should still have some outdoor openings so they breathe naturally, but they should include a unit heater, fans or a simple cooling system (as simple as possible given the climate) for more comfort.

In other words, many non-critical clinic spaces can be similar to barns and can be designed for simplicity and flexibility to reduce capital and operational costs for heating and cooling.

## Smart Cabinet Design

Cabinets are surprisingly expensive. You can use the following strategies to reduce spending:

- Use furniture instead of built-ins in the staff offices.
- Use open shelving instead of closed cabinets in laboratory. This means your staff will need to keep things organized to minimize clutter, but many hospitals think some extra organizing effort is worth the cost savings.
- Purchase prefabricated cabinets for the medical areas. A good example is Midmark cabinets. While these are expensive (usually more than other types of cabinets), they last forever, are modular, can be moved, and most importantly they can be depreciated like equipment, which gives veterinarians an accounting advantage. Over the lifetime of the building, they provide the most value.

## Embrace These Useful Materials and Finishes

Over the years, we have collected a variety of useful materials and finishes that provide the most value for dollars spent. Here are some of our favorites:

**Concrete.** Exposed concrete slabs can be used throughout a hospital, including the client areas, office areas and support areas. You will need a nicer floor in the equine treatment space for slip resistance and in the surgery space for sanitation, but you can use concrete elsewhere. This is completely fine! Think Chipotle or other such retail brands that have made the same decision with no negative consequences. If you leave your concrete slabs exposed, they will need to be sealed with a good sealer, which will need to be reapplied yearly.

**A good paint.** We use Sherwin Williams precatalyzed epoxy. Unlike other epoxies, this is a one-part epoxy, so it can be applied like regular paint, but it is significantly more durable. While the paint itself costs a little more than a standard latex, it lasts a long time and works well everywhere but the hose-clean areas, which will need something more durable. We use bold paint colors, which can make a space look more expensive and luxe.

## *Fiberglass or plastic wall protection.*

Wall protection is great. It can be applied over a framed wall to give you kick protection from horses and cleanability. We use fiberglass wall protection in treatment spaces. It is very inexpensive (I joke that it is darned near free). If you are using it in a hose-down space such as a surgery room, we recommend applying a liquid waterproofing to the walls first, like the type that is used under tile in a restroom, because these wall protection panels are not waterproof at their seams.

## Finishing Touches

Finally, we recommend reserving a little money for finishing touches. These touches make your clinic look customized, but they do not cost much.

A budget of \$1,000 could be enough for a few thoughtful pieces of art, photography, signage and décor in areas where clients are present. I use online sites such as Society6. Many retailers are not selling enough these days and are advertising good online deals to try to drive more business.

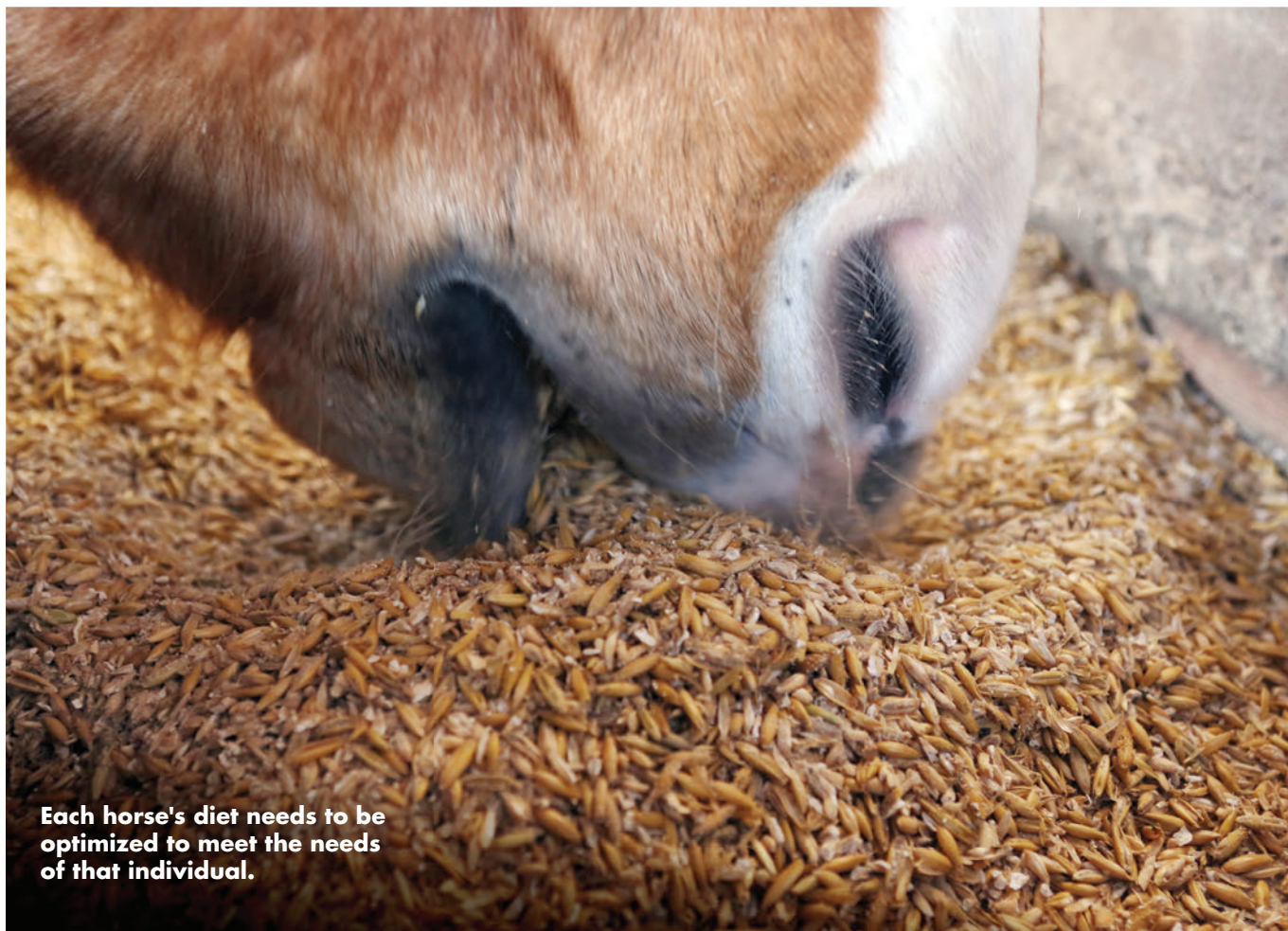
Being thoughtful and deliberate about how your place of business looks and feels goes a long way to creating a better, more professional environment.

## Take-Home Message

Constructing a veterinary facility in today's market takes more thought, and a certain dedication to caution, but it is doable and necessary.

A building is your practice's most important tool. Do not fear risk so much that you cannot grow, cannot thrive, cannot add a new service, or cannot serve your clients properly.

If there is anything we have learned from this past year during the pandemic, it is that we must persist in pushing our lives and our businesses toward our goals. We cannot wait for the world to be simpler, as it may never be. We must move forward with plans, figurative and literal, with a flexible and patient mindset. **EM**



**Each horse's diet needs to be optimized to meet the needs of that individual.**

# Diet-Related Disorders of Horses

A look at the bountiful buffet of issues served with a suboptimal diet

By Stacey Oke, DVM, MSc

**W**hat comes to mind when you think of diet-related diseases in horses? Do you picture an overweight, laminitic horse with insulin resistance? A morose, bony horse in a sandy paddock with sparse vegetation? Or an athletic horse with a gleaming coat that has tied up *again*?

All of these horses can suffer conditions related to less-than-ideal diets or diets that do not match the horse's lifestyle or genetic make-up. Here are a handful of the many conditions

that veterinarians can help owners consider when designing a horse's nutritional plan.

## Eating Too Little

Not all "hard keepers"—horses with a body condition score of approximately 3.5/9—are necessarily thin because they aren't fed enough. Some horses are picky eaters and therefore are hard to get calories into. If possible, have owners feed hard keepers their maximum amount of forage and concentrate: 2.5-3% of their body weight per day.



ISTOCK/DAN BRANDENBURG

**One study found that almost 50% of client-owned horses had inadequate pasture access, which puts them at risk for vitamin E deficiencies.**

“Of this, the *maximum* amount of concentrates in a horse’s diet should be 1%,” advised Kathleen Crandell, PhD, a nutritionist for Kentucky Equine Research based in Versailles, Kentucky.

“The first strategy we usually recommend is to feed a better-quality hay, maybe an alfalfa/grass mix, because higher-quality hay is usually more calorie dense,” Crandell advised.

If a horse still needs more calories or won’t readily consume the proffered meals, a variety of smaller, more frequent meals—such as bran mashes—could fill the void. Other high-calorie options include high-fat seeds such as sunflower or flax seeds. Corn oil can also be added, up to 1 cup twice daily (start with ¼ cup twice daily and work up to the full serving).

Veterinarians who don’t feel comfortable with ration balancing or working with nutritional challenges can contact independent equine nutritionists, university experts or nutritionists who work for commercial companies.

## Enough Vitamin E

Equally worrisome is a horse that isn’t getting enough of a good thing. Vitamin E is a good example of which veterinarians need to be aware.

One recent study of 331 horses residing in Oregon found that only 64.7% of

the horses had adequate blood levels of vitamin E. That study was led by Mariya Pitel, DVM, MS, DACVIM (Large Animal Internal Medicine), a private practitioner at Animals In Motion PC in Pennngrove, California.

“The main source of vitamin E is fresh, green forage; yet our study found that almost 50% of client-owned horses

*Horses need at least six hours a day on good pasture to meet their vitamin E needs, and research shows that some horses still will be vitamin E deficient.*

had inadequate pasture access, less than six hours per day,” Pitel said.

In this study, most owners (90%) offered a vitamin E supplement, but almost 40% of horses were supplemented with less than the recommended amount of vitamin E per day. The National Research Council (NRC) guidelines state that horses should have 500 IU of vitamin E daily, which can be achieved with direct supplementation

or by providing access to a minimum of six hours per day grazing fresh, green pasture.

“If an owner has true pasture, not a mostly dirt lot with some grass, and your horse spends more than six hours of the day on it, it likely won’t need to be supplemented,” said Pitel.

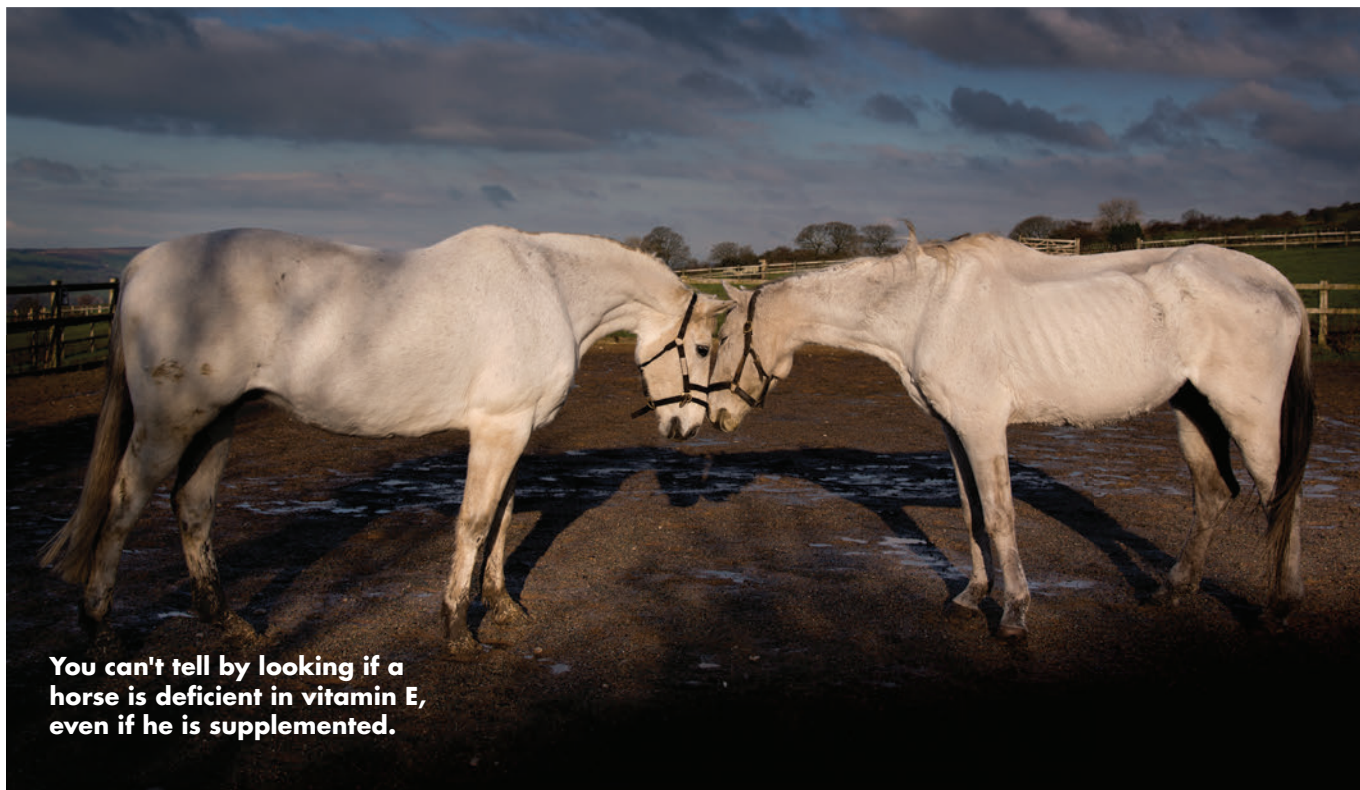
If a horse eats a predominately hay ration with minimal access to fresh pasture, then a veterinarian should encourage the owner to supplement that horse with vitamin E.

“Most combination supplements—those providing other minerals and vitamins—rarely provide enough vitamin E,” Pitel said. “Generally, a specific, natural vitamin E supplement ends up being necessary.”

Despite being offered a vitamin E supplement or having more than six hours of pasture access per day, just over 20% of the horses still had low vitamin E blood levels. This shows that a significant subset of horses that were apparently appropriately supplemented were still deficient in vitamin E. This could be because some horses might not ingest or absorb the vitamin E offered to them.

Veterinarians should know that testing can easily and economically be performed in horses to assess their vitamin E blood levels.

Pitel suggested that veterinarians



test horses for vitamin E status “as part of their routine health examination. If there is a history of deficiency or different management styles throughout the year, then testing twice yearly is recommended. For example, a horse may have normal vitamin E levels in the middle of summer when there’s plenty of fresh grass but become deficient in the winter months.”

“The consequences of vitamin E deficiency can be quite dire,” said Carrie Finno, DVM, PhD, DACVIM, associate professor and Gregory L. Ferraro endowed director of the Center for Equine Health at the University of California, Davis, School of Veterinary Medicine.

With a research focus on vitamin E, Finno listed three distinct neuromuscular diseases that can develop in horses deficient in this important fat-soluble vitamin: equine neuroaxonal dystrophy/equine degenerative myeloencephalopathy (eNAD/EDM); equine motor neuron disease (EMND); and vitamin E deficient myopathy (VEM).

She said horses “lucky” enough to

develop *only* VEM might enjoy a full recovery after adequate vitamin E supplementation has been initiated.

“There is no effective treatment for eNAD/EDM, and limited success with treating EMND,” said Finno. “Adequate supplementation and routine measurement of blood vitamin E levels are the best ways to help prevent these conditions from developing.”

### Eating Too Infrequently

Veterinarians know that horses require 1.5-2% of their body weight in forage per day (on a dry matter basis). Most horses involved in even moderate levels of work can thrive off a forage-only diet with appropriate supplementation of salt, vitamins and minerals.

“Not only is the amount of feed being offered to a horse important, but also the frequency of feeding,” advised Myriam Hesta, DVM, PhD Vet Sci, DECVCN (EBVS European Veterinary Specialist in Animal Nutrition), an associate professor of veterinary medicine at Ghent University in Belgium.

“If horses are offered meals too infrequently, they could be at risk for equine gastric ulcer syndrome,” said Hesta.

Using slow feeders and hay nets (or even double hay nets!) will allow intake of hay over many hours. Remember that left to their own, horses willingly forage for about 16 hours a day, leaving the stomach empty for only very short periods of time. When empty, a horse’s stomach will continue to produce gastric acid. Without the buffering action of saliva produced when horses consume feeds (primarily forage, but to a lesser extent concentrates), equine gastric ulcer syndrome (EGUS) can readily develop in certain populations of horses.

“When possible, allow pasture access while avoiding feed competition and stress in herd situations and avoiding pastures high in fructans,” said Hesta. “Also, avoid concentrates high in starch and sugar and molasses-added feed. If energy is required, offer vegetable oil instead of increasing dietary starch and sugars.

“When feeding concentrates, divide

the ration into many small meals a day,” continued Hesta. Breaking up feeding into four to six meals per day rather than only two will help decrease the occurrence of EGUS, Hesta said.

“If you want a positive effect in the long run in a horse prone to EGUS, then these nutritional changes are needed,” Hesta warned. “EGUS is likely to return when medications are stopped if dietary management is not optimally adapted.”

In addition, feeding only a limited number of meals per day also increases the risk of colic, as limited meal feeding creates large changes in water movement in and out of the colon and alters the microbiome according to research (Blikslager, A.T. Colic prevention to avoid colic surgery: A surgeon’s perspective. *Journal of Equine Veterinary Science* 2019;76:1-5).

## Eating Too Much

While horses should eat relatively consistently over the course of the day, providing too much food in a 24-hour period can be as much of a problem as feeding too little. In fact, equine obesity is now recognized as one of the most serious welfare concerns in horses.

In general, obesity refers to an unhealthy accumulation of body fat secondary to energy intake that chronically exceeds energy output. Horses with a body condition score of 7 or more on a 9-point scale are typically viewed as obese.

Catherine McGowan, BVSc, MACVS, DEIM, DECEIM, PhD, FHEA, FRCVS, has dedicated years of her career to understanding horse owners’ perception of body condition to help curtail the alarming rise in equine obesity. Veterinarians can use what she has found to help them manage clients who have obese horses.

“Many owners simply don’t recognize what an overweight horse looks like versus what a horse ‘should’ look like,” said McGowan, a professor of equine internal medicine at the University of

Liverpool’s School of Veterinary Science.

McGowan’s research also showed that some owners are very aware of their animals’ obesity, yet find dealing with it a constant battle.

“Part of the problem is that owners associate weight reduction strategies—notably diet and exercise—as negative for their horses and their ability to care for them. Other barriers related to managing their horses’ weight include rules and restrictions on types of pasture and forage available, turnout imposed by a farm owner, and even comments from other horse owners,” stated McGowan.

Notwithstanding these excuses, equine obesity must be addressed, as it has a myriad of ramifications.

## *Feeding a limited number of meals per day to horses increases the risk of colic due to changes in colonic water movement and an altered microbiome.*

“Overweight and obese horses are at risk for equine metabolic syndrome (insulin dysregulation) that can culminate in painful laminitis, but are also at risk for osteoarthritis, respiratory problems and infertility,” said McGowan.

For more information, McGowan recommended veterinarians visit [www.liverpool.ac.uk/media/livacuk/equine/documents/EquineWeightManagement.pdf](http://www.liverpool.ac.uk/media/livacuk/equine/documents/EquineWeightManagement.pdf) and her most recent article, “Exploring horse owners’ understanding of obese body condition and weight management in UK leisure horses” (*Equine Veterinary Journal*).

## Diet-Genetics Mismatch

Some horses’ genes do not allow them to eat a “typical” equine diet. A prime

example of that is a horse that “ties up”—or, even more specifically, ties up due to polysaccharide storage myopathy type 1 (PSSM1).

“This condition develops as a result of a gain-of-function mutation in the glycogen synthase gene that results in the overproduction of glycogen in muscle cells,” explained Molly McCue, DVM, MS, PhD, DACVIM, professor of equine medicine and associate dean for research at the University of Minnesota College of Veterinary Medicine.

With no medical treatment available, dietary management alone helps control the amount of glycogen produced in muscle cells. McCue, a key player in identifying the genetic mutation, recommended that clients of horses affected by PSSM1 adhere to the following guidelines:

- All feeds in the diet must have <12%—and preferably <10%—sugar (nonstructural carbohydrates). This includes all feeds that a horse is offered: forage, grains/concentrates, snacks and treats. “Owners need to avoid grass/pasture, fruit, carrots, molasses, bread, sugar cubes and corn. They also need to add up the carbohydrate content of all other feeds by reading the manufacturer’s label. For forage, whenever possible, owners should have each batch (pasture and hay) analyzed,” McCue recommended.
- If horses require additional energy, offer fat instead of sugar. “Suitable oils include soybean, corn, safflower, canola, flaxseed, linseed, fish, peanut and coconut. The amount of oil can be added gradually while monitoring the horse’s exercise tolerance and weight,” McCue said. Alternatively, McCue noted that horses can also be supplemented with rice bran. Rice bran and its products are palatable to most horses, have a moderate NSC, contain ~20% fat by weight, have vitamin E and are naturally high in phosphorus.
- PSSM1 horses also benefit from vitamin E supplementation. These horses

**Some horses are hard keepers because they are hard to get calories into, not because they are underfed.**



cannot have fresh, green forage and pasture, the main source of vitamin E. Commercial feeds are not necessarily needed and can provide too much energy for these horses. “Many PSSM1 horses do just fine with a forage-based diet and a ration balancer,” summarized McCue.

### Take-Home Message

“Some diets can have à la carte ingredients packing unpleasant surprises,” Crandell reminded veterinarians. “Hay can contain molds and dust that can trigger equine asthma, can contain endophyte-infested tall fescue inappropriate for pregnant broodmares late in

gestation, and can harbor insects such as blister beetles.”

Horses can also graze from pastures loaded with parasite eggs or can consume large amounts of sand during grazing that could contribute to colic. In fact, there are a wide array of diets and diet-related habits that negatively affect the health of horses.

So, while hay-based diets can meet the dietary needs of many horses, as veterinarians we need to remember that feeding horses requires finesse rather than a cookie-cutter approach.

“Each horse’s diet must be fine-tuned to optimize proper nutrition, and veterinarians need to encourage owners to stick with that optimal diet to avoid ‘diet drift,’” concluded Crandell. “Equine extension specialists in your area can be a valuable asset, as can equine nutritionists,” she added. “Use those resources to help your clients build better diets.” **EM**

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