

The
Modern
Equine Vet

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COVID-19: Is Telemedicine Right for Your Practice?

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Ask the Nutritionist

MARY BETH GORDON, M.S., Ph.D., EQUINE RESEARCH AND NEW PRODUCT DEVELOPMENT DIRECTOR, PURINA ANIMAL NUTRITION

Ask the Nutritionist is a monthly column featuring questions answered by PhD equine nutritionists and sponsored by Purina Animal Nutrition. Have a nutrition question you want to see featured? Email Marie Rosenthal. For clinics looking for specific nutritional advice, visit purinamills.com/ask-an-expert.

Do my clients really need to creep feed their foals?

It's that time of year when foals arrive or are already on the ground, and we're quickly approaching weaning. The best foal feeding advice to give your clients is to creep feed their foals. Creep feeding requires a specialized feeding environment that allows the foal to access feed but does not allow the mare access. Creep feeding enables foals to become accustomed to the diet they will consume post-weaning and enables their GI tract to gradually adapt to the change from milk to concentrate feed.

Creep feeding also allows you and your clients to better monitor foal feed consumption because the mares and foals are no longer eating together. In a traditional feeding setup, some mares will allow foals to consume as much as they like, but others don't let foals consume anything. Providing foals with individual access to feed ensures a more precise supplemental feeding method, plus you can monitor what and how much the foal consumes each day. Individual feeding also allows you to creep feed the foal based on its age, bodyweight and body condition score.

OVERCOMING OBJECTIONS

Creep feeding may seem unnecessary or cumbersome to your clients. After all, aren't the foals getting all their needs from the dam's milk and what they eat from the dam's feeder or pasture?

If your client relies solely on mare's milk for adequate nutrients for the suckling foal, then suddenly removes milk at weaning while adding concentrate feed and more forage, the rapid change can create a nutrition gap. In some cases, weaning-time stress causes foals to go off feed. Foals may burn more calories from increased whinnying and running around looking for their dams. To reduce stress to the mare and foal during weaning, your clients must provide constant, supportive and familiar nutrition to the foal. Creep feeding keeps foals eating and ensures consistency in their life.

5 Benefits of Creep Feeding Foals



Preparation for post weaning diet



Help GI tract adapt to change from milk to concentrate feed



Closely monitor feed consumption



Help maintain a steady growth rate



Provide consistency during the stressful weaning period

Foals weaned without creep feeding must catch up on nutrients they may have missed during the weaning process and can experience compensatory growth after the sudden addition of concentrate feeds and additional forage. This catch-up period or rapid growth can contribute to the development of a variety of orthopedic problems ranging from contracted tendons to other developmental orthopedic diseases (DODs).

SETTING IT UP

It may require some creativity to develop a creep feeding program that works for your client's barn or facility. Use specialized feeders and fencing configurations in pastures or creep feeding buckets in barn stalls. When setting up creep feeders in pastures, foals

should be grouped with their contemporaries by age or bodyweight to ensure they receive proper amounts of feed and that larger, more dominant foals do not overeat.

Creep feeding is worth the time and effort to implement individual foal feeding strategies. Foals get the right nutrition in proper amounts, so they maintain a steady growth rate, which contributes to the sound and healthy growth of their bodies.

Contact a Purina Ph.D. nutritionist for consultations through Purina Customer Service, 800-227-8941 or send us a message at www.purinamills.com/ask-an-expert.

UPCOMING TOPICS

April: Special needs of the competition horse

May: Endocrine disorders

June: Infections

Have a question you want to see featured? Send them to modernequinevet@gmail.com.



ABOUT THE AUTHOR

Dr. Mary Beth Gordon, M.S., Ph.D., is the Equine Research and New Product Development Director at Purina Animal Nutrition. She studies the effect of nutrition on horse health, separating trends from true efficacy.



Does Doxycycline Cross the Placenta?

B y P a u l B a s i l i o

Evolving antimicrobial resistance offers many obstacles for the practicing clinician, and the continuing expansion of the veterinary armamentarium is vital to equine health. However, there are little data on the transplacental diffusion and toxicity of antimicrobials in the mare.

“If you have been in clinical practice long enough, you’re going to be faced with the question of whether a drug is safe to use in a pregnant mare,” said **Igor Canisso**, DVM, MSc, PhD, DACT, DECAR, assistant professor at the College of Veterinary Medicine at the University of Illinois Urbana-Champaign. “Most of the time, you’re going to end up with a question mark on your face, because you don’t know the answer. Very few drugs have been studied to the point where we know about their safety in pregnant mares or even if the drug diffuses to the fetal fluids. We make a lot of assumptions.”

Dr. Canisso, who spoke here at the 65th Annual AAEP Convention in Denver, said that he recently became more excited about doxycycline and its potential in pregnant mares. The drug has great tissue penetration compared with the older drugs in its class, and it’s relatively safe in the horse. For example, anecdotal evidence suggests that prolonged administration of oxytetracycline can cause colitis, but not so with doxycycline.

“If you read [the literature], you can see that with some of the ‘odd’ diseases that we don’t see every day, doxycycline is there to save you,” he said.

Oral doxycycline has been shown to have good effect against granulocytic anaplasmosis, Potomac fever and Lyme disease, to name a few conditions. Dr. Canisso has used it for outbreaks of

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leptospirosis, and in older mares, exposed to *Leptospira*.

"I get more excited the more I look at doxycycline," he added.

The big questions

Before conducting a fetal fluid study, Dr. Canisso had to first tackle whether compounded oral doxycycline was absorbed at all.

"You can make all of the assumptions you want to," he said, "but just because a drug is compounded does not mean it is going to be absorbed. I had to answer that question before I jumped in and starting testing fetal fluids."

He conducted a small pharmacokinetic study involving compounded doxycycline 10 mg/kg PO in 7 mares. Blood sampling was done 15 times during the course of 96 hours. At the end of the trial, Dr. Canisso confirmed that the compounded doxycycline was absorbed by the mares.

With that settled, he moved on to whether doxycycline crossed the placenta, and whether any acute toxicity could be detected in foals born from mares treated late in pregnancy.

For that experiment, he administered compounded oral doxycycline 10 mg/kg every 12 hours to 6 mares, with another 6 mares acting as a control group. Both groups received daily physical examinations and measurements of milk pH; complete blood counts and chemistries were also collected.

When milk pH reached ≤ 6.40 , labor was induced with oxytocin (10 IU, IM). During second-stage labor, allantoic fluid was collected via free catch, and amniotic fluid was collected via puncture. Foal plasma and synovial samples were collected immediately after parturition, and foals were evaluated for transfer of pas-

sive immunity.

Amniocentesis and allantocentesis were not used for the study. "If I touch the uterus after 320 days, the mare will deliver quickly," Dr. Canisso said. "I would not be able to expose the mare to enough duration of treatment. I wanted to expose the mare for at least 2 weeks of treatment."

The big answer

Results showed that yes, doxycycline crosses the equine placenta. "Good concentration was achieved in allantoic fluid, the amniotic fluid and the foal plasma at the time of delivery," he explained.

The results were so good, in fact, that further evaluation of the data suggested that doxycycline concentrations were likely good enough to treat *Nocardioform placentitis*.

"*Nocardioform placentitis* doesn't cause infection in the fetal fluids—just on the chorionic surface," he said. "So we need to measure the tissue diffusion levels. This drug is markedly lipophilic and has good ability to penetrate tissue, so I think there is likely good diffusion levels."

In the foals, doxycycline was detected in plasma and synovial fluid, but no acute toxicity was seen in the experimental group.

Doxycycline inhibits metalloproteinase, which some have associated with the incidence of retained placentas.

"In cattle, metalloproteinase metabolism and placenta release is important, but in the horse, the literature is—at best—questionable," he said. "All the mares in the study passed their placentas just fine."

While the study only involved a small number of healthy mares, Dr. Canisso is hoping to take his findings and expand them to mares with systemic disease. **MeV**

Amikacin Effects on Equine Joint Cells

Amikacin at clinical doses induces rapid, pronounced cell death of equine joint cells. So, you might want to reconsider the amikacin doses used intra-articularly.

Researchers evaluated the cytotoxic effects of amikacin on equine chondrocytes, synoviocytes, and bone marrow and adipose-derived mesenchymal stem cells. The cells were harvested post-mortem from 3 horses with no evidence of osteoarthritis. The effects of amikacin on cell viability were assessed for different exposure times, concentrations, and with pH-buffered or unbuffered in media, as well as in the presence of synovial fluid. The mechanism of cell death was also evaluated.

Amikacin exhibited a dose-dependent killing of chondrocytes, synovial cells, and bone marrow and ad-

ipose-derived mesenchymal stem cells. At a concentration of amikacin achieved following typical intra-articular medication (25 mg/mL), rapid cytotoxic effects were seen for all cell types. **MeV**

For more information:

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 Jan. 29 (Epub ahead of print).

<https://beva.onlinelibrary.wiley.com/doi/abs/10.1111/evj.13243>



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1 Data on file.

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

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

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

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Managing a Mystery of UNEXPLAINED WEIGHT LOSS

Unexplained weight loss can be a complex presenting clinical sign—particularly when it is the only presenting sign. When a clinician is under pressure to perform thorough, cost-effective diagnostics, the starting point may be as elusive as the loss.

“I like to start by watching the horse eat,” said **Yvette S. Nout-Lomas, DVM, PhD, DACVIM, DACVECC**, here at the 65th Annual AAEP Convention in Denver. “This is something you can do before starting diagnostics that require sedation. It gives you a good idea of prehension, chewing and swallowing.”

Choose your next steps

Following a thorough physical examination and dietary evaluation, use any abnormal or suspicious find-

ings to guide the diagnostic plan.

“Often, horses with weight loss will have additional clinical signs that can point you toward specific ancillary diagnostics,” said Dr. Nout-Lomas, associate professor of medicine at Colorado State University. “For example, in a horse that has abnormalities swallowing, you might start with an upper airway exam and evaluate the larynx and the swallowing mechanism. You may find guttural pouch mycosis and related nerve damage.”

If the initial examination is within normal limits, and the horse is receiving proper nutrition, the path forward may not be as clear. Dr. Nout-Lomas has a standard set of diagnostics to run when the underlying cause is in doubt (see Box 1).

A routine hemogram and chemistries are invaluable

By Paul Basilio



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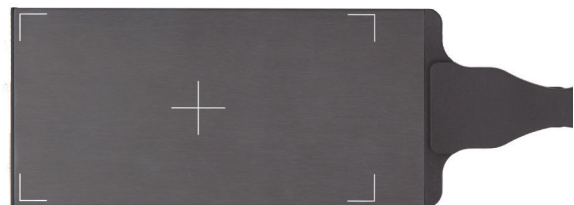
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Jon M. GIECHE, D.V.M., FAVD EQ, Diplomate AVDC EQ
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Imaging the Possibilities



in horses with unexplained weight loss. Any abnormalities can be used as a jumping-off point to direct further diagnostics. Anemia, inflammatory markers and hypoproteinemia caused by hypoalbuminemia are common abnormalities in such horses. Electrolyte imbalances can point to renal disease, hyperparathyroidism or malignancy.

“Horses with chronic renal injury often initially present for weight loss, so that’s hopefully one thing you can rule out with the profile,” she said. “Horses with immune-mediated myositis will also often have elevated muscle enzymes.”

If an endoscope is not available, nasogastric intubation can be used to evaluate the swallowing mechanism and test whether there are limitations in the

Looking for Clues

Blood work (eg, CBC, fibrinogen, serum biochemistry, creatinine, and electrolytes)

Fecal testing for infectious agents and parasites

Nasogastric intubation

Transrectal abdominal palpation

Abdominal ultrasonography

Glucose absorption test

Examination of GI biopsy specimens

esophageal phase for food reaching the stomach.

To test for larger caudal abdominal masses, transrectal abdominal palpation is a cheap and straightforward tool. The clinician can also shed light on the intestinal wall thickness and the size of the lymph nodes.

If That, Then This

Depending on earlier findings, the next round of diagnostics can help narrow the differential.

If the horse shows evidence of a chronic inflammatory process, then diagnostic imaging of the thoracic and abdominal cavities is indicated. If no abnormalities are found, then analysis of the peritoneal fluid should be performed.

If the horse is suspected to have a neoplastic condition in the thorax or abdomen, then Dr. Nout-Lomas suggested examining a biopsy specimen vs a fluid sample.

“Most of the neoplastic processes don’t exfoliate cells,” she said. “If you’re looking for a neoplastic disease, then you’re better off getting a biopsy specimen.”

If the investigation of hypoalbuminemia rules out insufficient production, catabolism and third spacing, then a glucose absorption test can evaluate the function of the GI tract.

“To identify the cause of weight loss in the horse, start with a good dietary evaluation, oral evaluation and GI-tract evaluation,” Dr. Nout-Lomas said. “A thorough physical exam and transrectal abdominal palpation are useful. Then, perform ancillary diagnostics as they seem to fit.”

MeV

Formula for Maintenance

“Equine nutrition is an area where practitioners can create a bond with their clients and become more proactive when it comes to explaining what horses can eat or how they can eat better,” said Dr. Nout-Lomas. “It’s a science and an art.”

For her, the science starts with a single formula:

Digestible Energy (MCal/day) = (bodyweight in kg) × 0.03 + 1.4

Using this formula, the digestible energy requirement for a 500-kg horse is ~16.4 MCal/day. This can be adjusted by a factor of 1 to 3 based on the horse’s workload.

“The art comes in the future while monitoring a particular horse and seeing how it does on the recommended diet,” she said. “It’s an important aspect of the approach to weight loss. It’s important to look at what is provided and if it meets the horse’s needs.”

Congress: Do More for Veterinarians During COVID-19

While the Families First Coronavirus Response Act will help many, it might not be enough for veterinarians, who are essential not only to animal and human health and welfare, but also the integrity of the food supply, according to American Veterinary Medical Association (AVMA) President **John Howe**, DVM.

“Veterinarians also play critical public health and research roles in the response to the COVID-19,” he said.

However, “many veterinary small businesses do not have the liquidity or cash flow to sustain the economic impacts of the outbreak for a long period of time,” Dr. Howe said, adding that the AVMA wanted

to work with Congress on “additional legislative action to address the economy and the economic viability of small businesses across the country.

“We will continue to work closely with the small business community to ensure that veterinary practices and their employees thrive.”

Further legislative measures are expected as Congress responds to the ripple effects and financial impact of the outbreak, and the AVMA will continue its advocacy efforts on behalf of the profession.

For more information, guidance and resources related to coronavirus for veterinarians and pet owners, check out avma.org/coronavirus.

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

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

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

PRECAUTIONS: Corticosteroids, including BetaVet®, administered intra-articularly are systemically absorbed. Do not use in horses with acute infections. Acute moderate to severe exacerbation of pain, further loss of joint motion, fever, or malaise within several days following intra-articular injection may indicate a septic process. Because of the anti-inflammatory action of corticosteroids, signs of infection in the treated joint may be masked. Due to the potential for exacerbation of clinical signs of laminitis,

glucocorticoids should be used with caution in horses with a history of laminitis, or horses otherwise at a higher risk for laminitis. Use with caution in horses with chronic nephritis, equine pituitary pars intermedia dysfunction (PPID), and congestive heart failure. Concurrent use of other anti-inflammatory drugs, such as NSAIDs or other corticosteroids, should be approached with caution. Due to the potential for systemic exposure, concomitant use of NSAIDs and corticosteroids may increase the risk of gastrointestinal, renal, and other toxicity. Consider appropriate wash out times prior to administering additional NSAIDs or corticosteroids.

ADVERSE REACTIONS: Adverse reactions reported during a field study of 239 horses of various breeds which had been administered either BetaVet® (n=119) or a saline control (n=120) at five percent (5%) and above were: acute joint effusion and/or local injection site swelling (within 2 days of injection), 15% BetaVet® and 13% saline control; increased lameness (within the first 5 days), 6.7% BetaVet® and 8.3% saline control; loose stool, 5.9% BetaVet® and 8.3% saline control; increased heat in joint, 2.5% BetaVet® and 5% saline control; and depression, 5.9% BetaVet® and 1.6% saline control.

DOSAGE AND ADMINISTRATION: Shake well immediately before use. Use immediately after opening, then discard any remaining contents.

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

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

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

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

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COVID-19: Can Telemedicine Help You Practice Social Distancing While Still Practicing Medicine?

By Marie Rosenthal, MS

As everyone is observing social distancing because of the COVID-19 pandemic, now might be a good time to integrate telehealth into your practice. From text messaging to consulting, using telehealth could enable equine veterinarians to care for some patients while keeping a safe distance from clients.

Telemedicine—communicating through digital technology as an extension of one's practice—is changing human health care. In fact during COVID-19, some people are being urged to seek telehealth before leaving their homes to go to a physician.

If used properly, it could be a useful tool for equine veterinarians, too, according to **Cris Navas**, PhD, MS, LV, DACVIM, an assistant professor of cardiology/ultrasound and internal medicine at the University of Pennsylvania School of Veterinary Medicine.

"I think telehealth is a good idea, but it's not the best medicine possible in my opinion," he said. "The best medicine possible is the veterinarian, the horse and the owner or the trainer in the same room at the same time. However, that sometimes is not possible, and for some specific scenarios, telecommunications technology can be the next best thing."

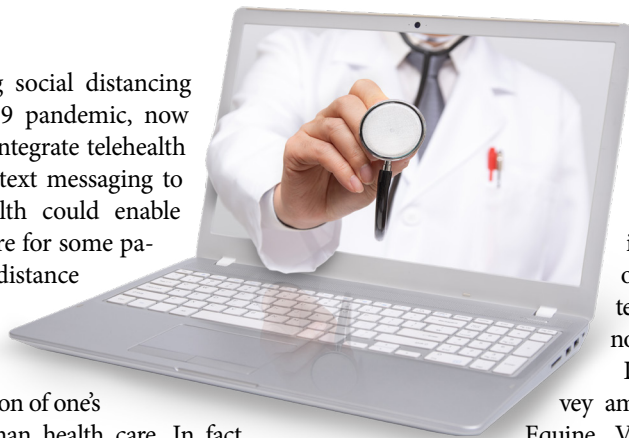
You must work within a valid veterinarian-client-patient relationship (VCPR) to assure your advice is followed and that the animals get good care. Having a valid VCPR is required and a team approach to the relationship with the client can help veterinarians decide whether telehealth would be a good fit for a particular client.

For equine veterinarians, telemedicine could be useful for following a patient's progress by texting and looking over a short client phone video or using wearable technology on the animal that is downloaded to the veterinarian's tablet for monitoring.

Triage is another area that could benefit from telemedicine. The technology could provide quick and easy access to the veterinarian, which could save the client some money, help the animal, but also increase the number of patients "seen" by the veterinarian and increase revenue by charging for the advice.

Telemedicine could also involve a consultation with an expert across the country or education for staff.

"If you eliminate the word "tele," these are all things that you do every day in clinical practice: monitor ani-



mals, triage cases, advise clients, practice medicine, communicate with your health team, consult or prescribe medications," Dr. Navas said.

"Telehealth means doing those things that you do on a daily basis, but using telecommunications technologies," he said.

Dr. Navas did a quick survey among veterinarians on the Equine Vet-2-Vet Facebook users group and asked them how they used telemedicine. The most useful method was text messages and images sent by cell phone; consulting with specialists or providing staff assistance were also useful. Of the 46 people who responded, 8 said there was no telehealth technology that was useful to them.

He also asked them if they thought telehealth was a good idea, and 47% thought it was a good idea, but he said veterinarians had concerns. Most were worried about not being able to do a good hands-on examination before making a decision, and that is a valid concern, Dr. Navas said. Telemedicine would not be a replacement for all clinical medicine.

Telemedicine is just another tool that can help the veterinarian do his or her job better. "I want to use all the tools that give me an advantage for generating better outcomes for my patients, and telehealth could be one of those tools," he said.

"I believe telehealth has the potential to improve animal health, education and the profession," Dr. Navas said. However, the profession has to assume the responsibility to define best practices. In the meantime, both the American Veterinary Medical Association and the AAEP have information about veterinary telehealth.

If the telehealth services you offer during COVID-19 work for your practice during the outbreak, there is no reason not to continue them once it is over. **MeV**

New Bolton Center has included telehealth in Penn Vet's response to COVID 19 pandemic.

Find out more here.



Down But Not Out—Recumbency in a Standardbred Gelding



By Andrea Whittle,
BS, LVT

A 2-year old Standardbred gelding in central Kentucky presented recumbent to Rood and Riddle Equine Hospital in November 2018 with a detailed history from

the referring veterinarian and a significant list of differential diagnoses.

Diagnostics, appropriate treatment and intensive nursing care over several weeks led to a very successful outcome for this gelding and his owners.

This gelding had been recently purchased by his owners in Ohio. He was actively in training at the time of purchase and was an exciting prospect for his owners. Shortly after purchase, they had him castrated in the field; it was stated on his admission notes that a tetanus toxoid injection was not given at the time of castration. The castration was performed 2 weeks prior to admission.

The referring veterinarian gave a detailed history of the 24 hours prior to admission. The gelding was presented to him at the track with swelling in the scrotal area and weakness in the pelvic limbs. This progressed to the horse laying down and being unable to pull his hind legs

up to rise without assistance. At this point he was able to dog sit and appeared strong through the thoracic limbs. He was given acepromazine to safely load, moved onto a thick tarpaulin and loaded into a trailer for referral.

Upon presentation to Rood and Riddle, he was in right lateral recumbency (RLR) and unable to sit sternal with or without assistance. He was pulled onto the Large Animal Glide and moved to a well-bedded, padded stall with a hoist. He was aware and responsive to noise and contact. His weight was estimated at 1,000 lb.

A physical examination was completed with unremarkable findings; temperature 99°F, heart rate 72 beats per minute (bpm), respiration rate 24 breaths per minute, slightly bright pink mucous membranes and a capillary refill time of 2 seconds. Upon palpation of his skeletal muscle his larger muscles groups were firm to touch but did not appear to elicit a pain response. All 4 limbs were difficult to flex and returned to a stiff extended position. Other than the lateral aspect of the right carpus his legs were free of abrasions. The scrotal swelling was approximately the size of a grapefruit, soft and cool to touch. An ophthalmic examination revealed a significant amount of debris in the right eye from the stall and trailer; the eye was rinsed with eyewash and lubricated with artificial tears ointment until his recumbency could be changed and the eye could be examined more

**Diagnostics,
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for this gelding.**



Fig 1. Ultrasound image of scrotal swelling



Fig 2. Radiograph of poll

Images courtesy of Andrea Whittle, BS, LVT

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Dispense Medication	Pharmacist	
Take and/or Test Bloodwork	Medical Lab Technologist	
Physiotherapy	Physiotherapist	

Get to know *your* horse's veterinary healthcare team. Introduce yourself to a **CEVT** next time you visit your equine clinic.



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Fig 3. Standing in UCD lift



Fig 4. Standing without support



Fig 5. Knuckled and stiff in hind legs



Fig 6. Situated in stall to eat

thoroughly. No third eyelid prolapse was noted. At this point we were limiting any movement of the neck as a history of trauma had not been ruled out.

A 14 g 5.25" long-term Mila catheter was placed in the left jugular vein (LJV) after the vein was clipped and aseptically prepared. A complete blood count and chemistry panel were submitted. The pertinent results were white blood cell count (WBC) $12,400 \times 10^3$, packed cell volume (PCV) 41.7%, serum amyloid A (SAA) 814 ug/mL, creatine kinase (CK) 64260 U/L and aspartate aminotransferase (AST) 1604 U/L; his serum potassium was a little low at 3.2 mmol/L. A 30" extension set was secured to the needle-free adaptor (microclave) of the catheter extension set to allow safe catheter access in either recumbency. The microclave was left in place as a safeguard in case the 30" set becomes disconnected when the catheter is on the recumbent side.

An ultrasound (US) examination of the scrotal swelling was completed; the swelling appeared uniformly edematous with no abscess formation.

Differential diagnoses were discussed with the owner after the PE, ultrasound and blood work results were completed. This list included the following:

- Myositis
- Tetanus
- Botulism (suspect incisional)
- EPM
- Trauma and damage to the cervical spine

After this discussion the decision was made to rule out or immediately counter several of the differentials.

Radiographs of the cervical spine were taken stall side using a NEXT Equine DR system. Lateral views of the skull, poll and cervical spine revealed no significant abnormalities.

A lumbosacral cerebrospinal fluid (CSF) tap was completed through a clipped and aseptically prepared area; a 12 cc lidocaine block was administered via a 1.5" 20 g needle and an 18 g 6" BD spinal needle was used to obtain the sample. The CSF was clear and sent to Equine Diagnostic Solutions (EDS) for testing for *Sarcocystis neurona* and *Neospora hughesi*. Results were returned later that day and were negative for both organisms.

A 250 mL bag of Botulism Antitoxin was thawed and administered through a blood/plasma IV set. The available antitoxin was specific to Type B. The plasma ran without complication or reaction.

After these procedures were completed, the gelding was rolled dorsally to left lateral recumbency (LLR) with the use of shackles and ropes on each limb as well as head and neck support. In the process of doing this he was also rolled onto the 'down' straps of the UCD Large Animal Lift for ease of placement. A thorough examination of the right eye was completed; more eye wash was used and there was a small area of fluorescein stain uptake centrally on the cornea. Neobacimyx (QID) and atropine (SID) ophthalmic ointment treatment were started.

Continuing treatments were started with the administration of potassium penicillin (22,000 IU/kg IV QID), gentamicin (6.6 mg/kg IV SID) and flunixin (1.1 mg/kg IV BID). The gelding was given a dimethyl sulfoxide (DMSO) bolus of 500 mL in 5 L of lactated ringers solution (LRS). He was started on a continuous rate fluid infusion of LRS with 20 mEq of KCl solution/liter after the DMSO bolus.

He was allowed to rest quietly in LLR with the barn lights off until the DMSO bolus was complete. Once this was disconnected the UCD Lift was fully fitted and attached to the hoist bar. For safety purposes the barn aisle and doorway were cleared of possible trip hazards and only minimal personnel were around the stall front; each person was allocated a clear job and a leader was identified. The UCD lift was used to assist with rolling the gelding to a sternal position. This was accomplished and he was offered a small pan of water to assess his ability to swallow—he passed the swallowing test. The first attempt to lift him to his feet was successful; he was stiff through all 4 limbs to lift but once he was vertical next to a padded wall for support, he was able to take his own weight and hold his head in a normal position. The pressure and support of the UCD lift was gradually released with no change to his ability to stand. He urinated once he was up; it was dark brown.

Once up, he was offered a bucket of water and a loosely packed hay net of grass hay. He was also started on Vitamin E (Elevate 4,000 iu PO SID) and methocarbamol powder (50 mg/kg PO BID). The UCD Lift was



Fig 7. Grazing



Fig 8. Loaded to leave RREH

removed after about 45 minutes; the gelding was able to walk around the stall. He was stiff through his hocks and dragged some straw with each step.

He stayed up for about 3 hours before laying down and resting quietly. He was allowed to rest overnight with his recumbency changed once. This was repeated the next day when he stayed up for 7 hours, allowed to rest and then stood again with the UCD for 16 hours.

The next attempt to lift him in the UCD Lift was less successful. The stiffness in the pelvic limbs was drastically increased and he would hold them in a much exaggerated, hyperextended, stance on tiptoe.

Unfortunately the stall that he was housed in did not have sufficient height on the I-beam and hoist to be able



Fig 9. At home on layup

to pull his hind legs forward and help him place them, soles down, in the stall. After some troubleshooting and measuring, we realized that the second padded hoist stall in the barn had the I-beam placed one concrete block higher, giving us an additional 8 inches.

He was induced with xylazine, butorphanol and ketamine, maintained on a GKX CRI, placed on the glide and moved into the second stall. After sufficient time to wake up from sedation, he was lifted again with success. The biggest change to his mobility was an inability to support himself out of the sling, inability to walk and frequently knuckling on both hind fetlocks. Lightweight, padded, shipping wraps were placed around the hind fetlocks to protect them when he was knuckling.

Full blood work was submitted again with the following pertinent results: AST 5597 U/L, CK 214309 U/L, and SAA >3,000 µg/mL.

With myositis as the primary diagnosis at this point, he was placed onto a butorphanol CRI (0.01mg/kg/hr in LRS) for additional pain management and started on dantrolene (4 mg/kg PO TID). His attitude and appetite responded to the increased pain management, and he began to relax in the UCD lift; it was only in contact with him on the sternum and in front of the point of shoulder as he learned to lean forward

for support. A tapering dose of IV dexamethasone was started at 30 mg IV.

He was very responsive to grooming, well-behaved enough to have his left knee cleaned and wrapped and only mildly evasive for his ophthalmic treatments. His owners elected not to undergo a muscle biopsy and subsequent testing and put that money toward continuing his care in the hospital for as long as needed as he was responding to his care and treatments.

Once he had learned to use the lift well, we started to work on his mobility to encourage movement and stretching within his bounds of comfort. His butorphanol CRI was discontinued at this time. His appetite was a good motivator and reward to use with him. His straw bedding was banked up to the sides of the stall to prevent him from bundling it up between his legs and a layer of peat moss was used for urine absorbance and traction. His hay was placed on a straw bale several feet in front of him, just out of his reach; his hind legs were initially lifted and manually placed forward for him to encourage steps forward. This was repeated every 2–3 hours, and he would slowly move around the stall. Occasionally he would knuckle both hind fetlocks and require help to regain his correct stance.

His next stage of physical therapy was to encourage locking and loading of the hind fetlocks. To do this, the UCD lift was raised slightly to support a small amount of hind-end weight and he was gently rocked about 6 inches from side-to-side to load and unload each fetlock. He was always compliant to these sessions; we did this 6 times a day for about 10 minutes at a time.

Since he was eating consistently now, his IV fluids were reduced in rate over 3 days then discontinued. After 6 days his SAA was rechecked at 220 µg/mL, his muscle enzymes decreased to CK 1545 U/L and SGOT / AST 7467 U/L.

His right eye wasn't responding as well as hoped to its current treatment; he started guarding it, and there was increased tearing and swelling. A thorough ophthalmic examination was performed

again with proparacaine solution. The corneal ulcer had increased, and his medication regime was changed to gentocin (BID), terramycin (BID), miconazole (BID) and atropine (BID) ophthalmic ointments.

As his mobility increased and the frequency of the fetlock knuckling decreased, the UCD lift was taken off. His hay pile was still moved around the stall periodically

**After returning
to his owners,
the gelding was
rested for >6
months before
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introduced back
to work.**

to encourage him to walk. To improve his body weight he was started on small frequent meals of a grain-free, low-starch, oil containing balanced feed. This proved to be a very good reward for physical therapy—such as picking up each foot for very brief periods, stepping sideways with the hind legs and raising his head to encourage him to load weight through his hind legs.

On day 8, he laid down in the stall in the early morning hours. He was allowed to rest for 6 hours. He needed the UCD to rise a few more times until day 16, when he was able to be assisted to his feet with shoulder, hip and tail support. He became consistently easier to assist to rise each time until he was able to get up with 1 person offering support on his hip.

On day 15, he went for his first walk out of the stall. This was repeated daily for increasing lengths of time; he really seemed to benefit from this time to graze and observe the daily activities of the hospital. Once he was able to turn, graze and walk short distances without concern, arrangements were made to discharge him to a local layup farm. At this point he was just receiving Vitamin E, Dantrolene, Methocarbamol, flunixin paste and his ophthalmic medications. The abrasions on the right carpus were healing well. He stood on his own with no assistance for the first time on day 22.

On the day of discharge (day 24), he walked straight

onto a ramp load trailer without hesitation.

He was left untied in an open area of the trailer in case he lost his balance; he made it to the layup farm without incident and unloaded straight to a round pen. He was to remain on a low-starch diet with fat-based calories, good-quality grass hay and short daily walks.

After several weeks at layup, the corneal ulcer was resolved and he was spending as much time as the weather would allow in a round pen during the day. Every few days there would be evidence that he had laid down overnight but never evidence of a struggle to rise.

When he returned to his owners, he was turned out into a paddock and rested for more than 6 months before there was any pressure on him to return to training.

His owners have taken steps to consult with the RDVM, his clinician at RREH and a nutritionist before asking more of him. As of August 2019, he was being gradually reintroduced to a harness and work. The most recent update I have is a video from early October 2019 of him jogging on the track with a driver. **MeV**

About the Author

By Andrea Whittle, BS, LVT, is an internal medicine technician at Rood and Riddle Equine Hospital in Lexington, Ky.

Radiographic Findings of PSBs Linked to Poor Showing

More radiographic channels and greater channel diameter in proximal sesamoid bones are associated with poorer measures of performance.

Researchers from Australia did a cross-sectional study to investigate the clinical significance of radiographic changes in proximal sesamoid bone (PSB) vascular channel morphology, or sesamoiditis.

The paired PSBs were isolated from the forelimbs of Thoroughbreds undergoing post-mortem examination. This included yearlings in pre-training, mature horses in race training and those resting from training or those that had retired from racing in the last 12 months.

Each PSB was radiographed and assigned a vascular channel grade using previously published and novel grading systems. The sesamoids were then separated and individual whole bones were imaged with microcomputed tomography (μ CT), an imaging modality that allows assessment of bone microstructure in three dimensions. Associations between radiographic, μ CT and performance variables were investigated with uni- and multi-variable generalized linear models.

One hundred and eighteen PSBs were collected from 59 horses aged between 16 months and 12 years.

Nine horses were resting from training and 50 were in race training at the time of death. All PSBs had at least 1 vascular channel observed on μ CT originating from the abaxial border; 63.6% (75/118) of which were observed radiographically. Proximal sesamoid bones with a higher bone volume fraction and wider channel diameter on μ CT were more likely to have vascular channels identified on radiographs.

Greater radiographic channel number and diameter were associated with fewer career placings. No association was found between any variable and the horse being subjected to euthanasia due to catastrophic fracture. **MeV**

For more information:

Lloyd KA, Ayodele BA, Hitchens PL, et al. Associations between the radiographic appearance of vascular channels in proximal sesamoid bones, their microstructural characteristics and past racing performance in Thoroughbreds. *Equine Vet J.* 2020 Jan. 28 (Epub ahead of print).

<https://beva.onlinelibrary.wiley.com/doi/abs/10.1111/evj.13239>

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