The Modern Equine Vet

www.modernequinevet.com

Vol 12 Issue 7 2022

Evaluating Obesity

Reducing Iris Cysts

Can You Predict Faults in Show Jumpers?

Technician Update: Case of *C. botulinum*

TABLE OF CONTENTS

4 **COVER STORY**
Evaluating the Overweight or Obese Horse

Cover: Shutterstock/Alla-L

OPHTHALMOLOGY
Diode Laser Safely Reduces Iris Cysts 10

TECHNICIAN UPDATE
A Case of *Clostridium botulinum* in a Warmblood Foal 12

NEWS NOTES
CBD for Horses Passes Safety Test 3
Survey: More Species Threatened Than Thought 17
Equine Hepatitis Viruses Improve the Understanding of Human HCV 18
Faults in Show Jumpers Might be Predictable 20

ADVERTISERS

EpicurPharma 3
American Regent/Adequan 7
CareCredit 9
Arenus Animal Health/Assure Gold 11
Arenus Animal Health/Aleira 13
Arenus Animal Health/Assure Gold 19
Arenus Animal Health/Releira 21

The Modern Equine Vet

SALES: ModernEquineVet@gmail.com
EDITOR: Marie Rosenthal
ART DIRECTOR: Jennifer Barlow
CONTRIBUTING WRITERS: Paul Basilio • Adam Marcus
Cath Paulhamus
COPY EDITOR: Patty Wall
Published by

PERCYBO media ■ publishing

PO Box 935 • Morrisville, PA 19067
Marie Rosenthal and Jennifer Barlow, Publishers

LEGAL DISCLAIMER: The content in this digital issue is for general informational purposes only. PercyBo Publishing Media LLC makes no representations or warranties of any kind about the completeness, accuracy, timeliness, reliability or suitability of any of the information, including content or advertisements, contained in any of its digital content and expressly disclaims liability of any errors or omissions that may be presented within its content. PercyBo Publishing Media LLC reserves the right to alter or correct any content without any obligations. Furthermore, PercyBo disclaims any and all liability for any direct, indirect, or other damages arising from the use or misuse of the information presented in its digital content. The views expressed in its digital content are those of sources and authors and do not necessarily reflect the opinion or policy of PercyBo. The content is for veterinary professionals. ALL RIGHTS RESERVED. Reproduction in whole or in part without permission is prohibited.

CBD Appears Safe

By Adam Marcus

Supplements containing 150 mg of cannabidiol (CBD) do not appear to cause ataxia or sedation in horses, a new study found. Whether they do anything beneficial is another question, however.

"Lots of people are using those supplements; over 100 [supplements] in the equine world have CBD in them," said **Frank M. Andrews**, DVM, MS, DACVIM (LAIM), the head and LVMA Equine Committee Professor of Equine Medicine at the LSU School of Veterinary Medicine in Baton Rouge, who led the study.

In humans, CBD—a hemp-derived substance that is closely related to THC but does not possess psychoactive properties—has been used to treat a variety of ailments, from inflammatory conditions to epilepsy.

For horses, Dr. Andrews said, the products are most attractive as an alternative to nonsteroidal anti-inflammatory drugs (NSAIDs) for lameness due to arthritis, perhaps the leading concern of horse owners. Unlike NSAIDs, CBD is not linked to kidney damage or gastrointestinal ulcers. Musculoskeletal pain, inflammation and seizure disorders are other potential targets for CBD, he added.

Dr. Andrews and his colleagues tested a supplement containing 150 mg CBD in 20 adult Thoroughbreds. Half received the supplement containing CBD and half received the supplement without the compound once daily in their feed for 56 days. The supplement, from SmartPak Equine, comes as pellets containing alfalfa meal, artificial apple flavoring, sunflower meal and other ingredients, Dr. Andrews said. The supplement was "well-tolerated" and "palatable," he added. "Tests showed that the horses did not appear wobbly or sedated in their stalls after eating the CBD pellets. Nor did they have signs in their blood of liver or kidney dysfunction," Dr. Andrews said.

The study only looked for adverse events, not the clinical effectiveness of the supplements. Even so, Dr. Andrews cautioned horse owners to consult with regulatory bodies about CBD use before entering their horses in competitions to make sure it is permitted. **MeV**

CHECK OUT

"Laying the groundwork for evidence-based CBD in horses" in the April 10, 2021, issue of *Modern Equine Vet*.

For more information:

Andrews FM, et al. Effects of a supplement containing cannabidiol (Cbd) on sedation and ataxia scores and health. *SSRN*. 2022 May 23. **https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4117072**

AVAILABLE FOR OFFICE USE

epicur® PHARMA

GUAIFENESIN
50 mg/mL, 1000 mL Bag INJECTION SOLUTION

TAC OINTMENT
0.03% and 1% *(Tacrolimus Ophthalmic)*

- Made under cGMP[1]; same FDA regulations followed by the pharmaceutical manufacturing industry
  1 cGMP - Current Good Manufacturing Practices
- CONSISTENT QUALITY backed by the FDA manufacturing process
- Approved for distribution

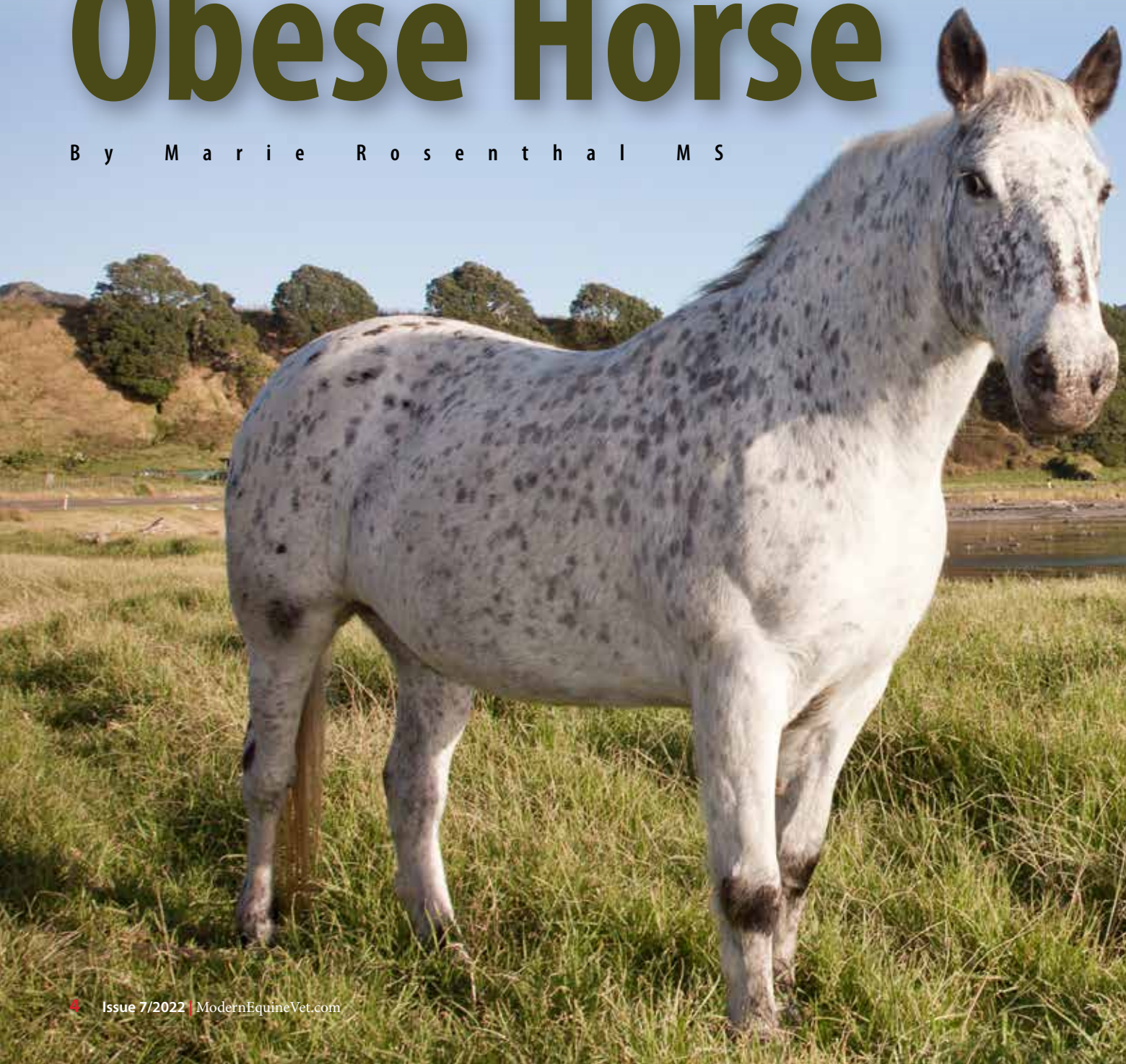
To order, call
888.508.5032

AAHA STRATEGIC ALLIANCE PROGRAM Bronze Member

PROUD SPONSOR VHMA

Evaluating the Overweight or Obese Horse

By Marie Rosenthal MS



Every veterinarian has cared for a horse that is at risk for laminitis, insulin dysregulation, heat intolerance, cardiovascular disease and reproductive inefficiency, etc., because it was overweight or obese.

And if it feels like this is describing more and more patients. It might be. Depending on the region, anywhere from 30% to 50% of U.S. horses are overweight or obese. The region where the veterinarian is practicing, as well as the horse's discipline or work will influence the animal's body condition, explained **Megan Shepherd,** DVM, PhD, DACVIM (Nutrition), a nutrition consultant at Comparative Veterinary Clinical Nutrition (https://veterinaryclinicalnutrition.com).

Just as it occurs in people, "it's relatively easy to establish habits that result in overweight condition," Dr. Shepherd said at the 2022 ACVIM Forum.

Diagnosing the Overweight Horse

The first step is diagnosing the overweight horse, and the practical way to do that is by using the body condition score (BCS) created by Don Henneke. Dr. Shepherd recommends the 9-point score, rather than the 5-point score. But whatever score is used, it should be consistent and mentioned when providing information, she said. For instance, 4 out of 5 is a severely overweight horse; but 4 out of 9 might be just right.

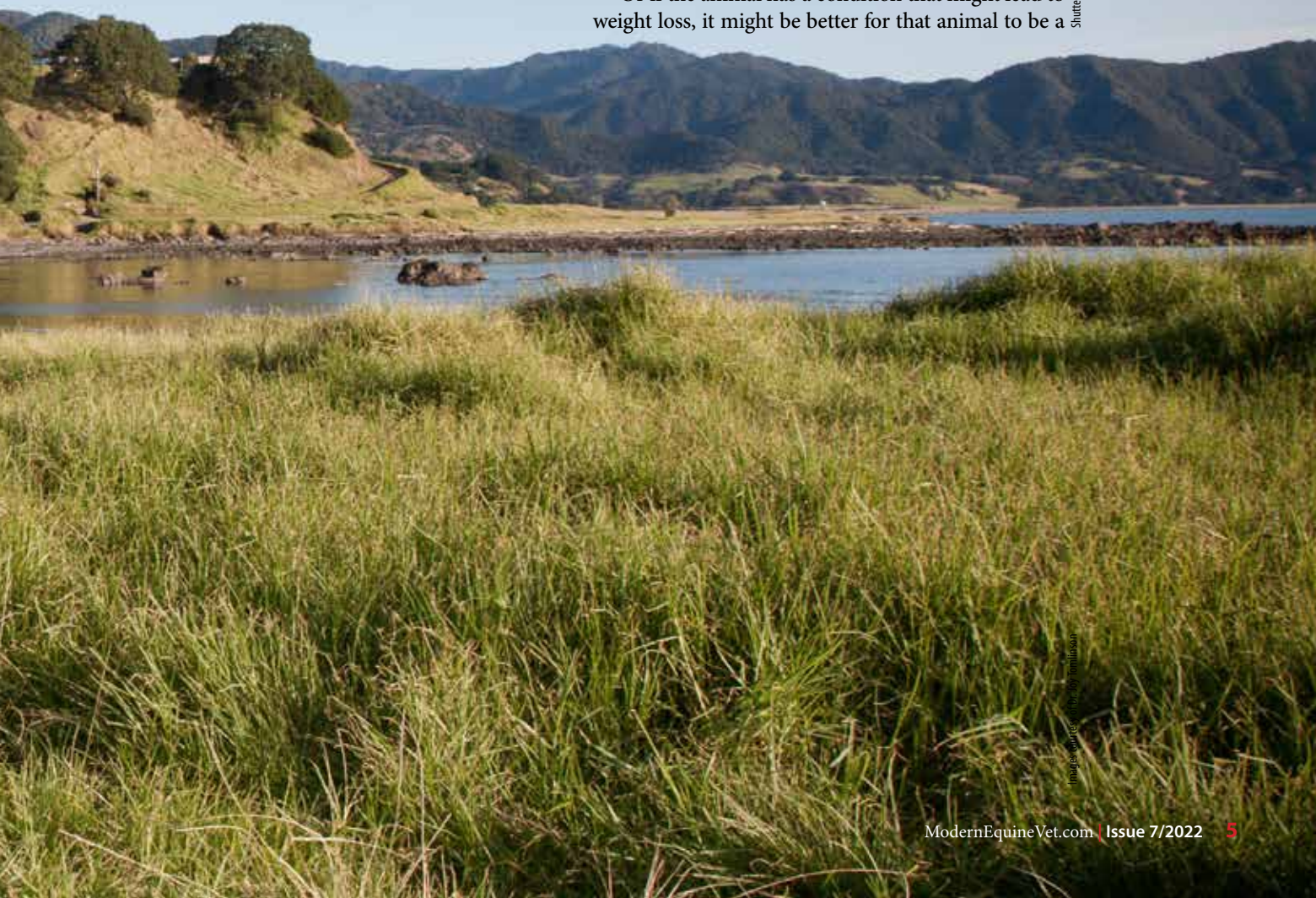
Although BCS is subjective, "it generally is helpful in distinguishing the horse that's underweight versus the horse that is at a healthy weight versus the horse that is overweight," Dr. Shepherd said.

People tend to focus on the ribs, but remember that there are 6 regions that are assessed to develop the BCS: the neck, the withers, behind the shoulder, over the ribs, along the back and the tailhead. She also suggested assessing both sides of the animal, because sometimes there is more adiposity on one side than the other.

"It's easy to focus on the ribs, but that's not the only place to look when we're body-condition scoring. As far as targets, generally 4 to 6 out of 9 is a general target body condition score for the horse, and horses that are a 7 out of 9 or greater are considered overweight."

However, the horse's history could require tailoring that general assessment, according to Dr. Shepherd. "If I have a horse that currently has laminitis or has a history of laminitis, then I would rather that be a 4 or 5 [out of 9], preferably a 4," she said.

Or if the animal has a condition that might lead to weight loss, it might be better for that animal to be a



Shutterstock/S Curtis

little heavier to compensate.

Other tools like the Cresty neck score can also be used, but they are complementary rather than a replacement for BCS, she said.

Ultrasonography is an objective way to diagnose obesity and can be useful in providing a visual for the client, but Dr. Shepherd finds it challenging to be consistent with the placement of the probe, so she doesn't normally recommend it.

The Importance of Diet History

Once the BCS of the animal's weight is determined, assess the animal's overall health and diet.

The diet history is often very telling, according to Dr. Shepherd.

"For me, the current diet provides huge context into what needs to happen to get the weight from the horse. The diet history provides context. Evaluating the diet history can take time," she warned. "And that's something that general practitioners and primary care veterinarians just have limited time to do.

"I don't expect everyone to sit down and crunch the numbers on the current diet, but just getting a general idea of what this horse has been eating [is helpful]. If the horse has been eating ad lib forage—they've either had ad lib hay or been out on pasture unmuzzled—then we know that simply limiting intake can make all the difference in cutting back calories and promoting healthy weight loss," she said, adding that horses can eat up to 5.5% of body weight per day.

Cutting back the concentrate might help. "The horse that's overweight certainly doesn't need a concentrated source of calories."

Dr. Megan Shepherd

Cutting back the concentrate—if that is what they are eating—also helps take off the weight. "The horse that's overweight certainly doesn't need a concentrated source of calories," Dr. Shepherd said.

Find out if this is the first time that calorie restrictions were placed on the horse. If not, what were they and how did they work? If this is not the first diet, then probably a stricter diet will be needed, she said.

Try to get as much specific information from the owner as possible. Do they measure when they feed? What do they use to measure the feed?

DISCUSSING WEIGHT: NO BODY SHAMING, PLEASE

Whether it's their dog, their horse or themselves, people get defensive about being overweight, so it is important not to "body shame" even when talking about an animal, explained **Dr. Megan Shepherd**.

The veterinarian's goal should be to help the animal reach an ideal body weight, and that can only be done in partnership with the person managing the horse, whether that is the owner, trainer or farm manager.

"When we're talking to clients, caregivers, or owners about a horse's body condition score, consider the potential impacts of overweight shaming, or fat shaming," Dr. Shepherd said. "We know this has negative consequences in human medicine, and it potentially has negative consequences in companion animals.

"We don't want to put the client on the defensive, we want to partner with them in the process of getting the weight off the horse," Dr. Shepherd said.

She said that she tends to focus on the fact of the animal's weight, and she might never even use the term overweight. "I might say something like: "I would estimate their healthy weight to be X pounds with X pounds being lower than what their current weight is."

A lot of the approach depends on the client and the relationship she has with the client, Dr. Shepherd said. That relationship would "certainly inform how you broach the subject of the horse being overweight to them, but just be cognizant of the words you use."

Remember the adage, "you can lead a horse to water, but you can't make it drink."

Ultimately, she said, it's the client's decision whether to help the horse.

"We can educate them as to the consequences of a horse being overweight, and we can recommend the horse be put on a weight loss plan or recommend that we help them work toward the horse's healthy weight, but it's up to the caregiver or to the owner to decide whether that's going to be pursued or not."

Shutterstock/ Daisy Daisy

There's nothing else like it.

For more than 30 years, Adequan® i.m. (polysulfated glycosaminoglycan) has been administered millions of times[1] to treat degenerative joint disease, and with good reason. From day one, it's been the only FDA-Approved equine PSGAG joint treatment available, and the only one proven to.[2,3]

Reduce inflammation
Restore synovial joint lubrication
Repair joint cartilage
Reverse the disease process

When you start with it early and stay with it as needed, horses may enjoy greater mobility over a lifetime.[2,4,5] Discover if Adequan is the right choice. Visit **adequan.com/Ordering-Information** to find a distributor and place an order today.

BRIEF SUMMARY: Prior to use please consult the product insert, a summary of which follows: **CAUTION:** Federal law restricts this drug to use by or on the order of a licensed veterinarian. **INDICATIONS:** Adequan® i.m. is recommended for the intramuscular treatment of non-infectious degenerative and/or traumatic joint dysfunction and associated lameness of the carpal and hock joints in horses. **CONTRAINDICATIONS:** There are no known contraindications to the use of intramuscular Polysulfated Glycosaminoglycan. **WARNINGS:** Do not use in horses intended for human consumption. Not for use in humans. Keep this and all medications out of the reach of children. **PRECAUTIONS:** The safe use of Adequan® i.m. in horses used for breeding purposes, during pregnancy, or in lactating mares has not been evaluated. For customer care, or to obtain product information, visit www.adequan.com. To report an adverse event please contact American Regent, Inc. at 1-888-354-4857 or email pv@americanregent.com.

Please see Full Prescribing Information at *www.adequan.com*.

Start with it. Stay with it.®

Adequan i.m.®
polysulfated glycosaminoglycan
www.adequan.com

1 Data on file.

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

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

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

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

All trademarks are the property of American Regent, Inc.
© 2022, American Regent, Inc.

PP-AI-US-0629 (v2.0) 05/2022

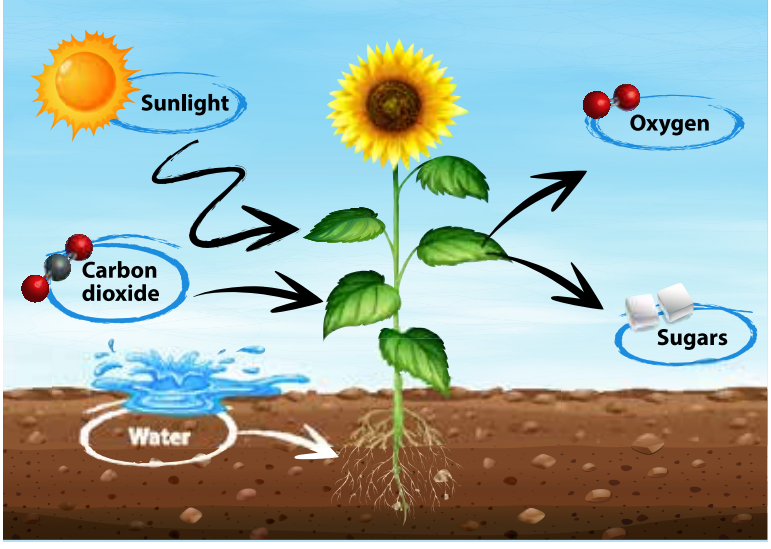
CARBOHYDRATES AND PASTURE

Nonstructural carbohydrates are developed by photosynthesis. The more time the plant spends in the presence of the sun photosynthesizing, the higher the nonstructural carbohydrates.

If there are adequate growing conditions, the plant grows day and night, but only photosynthesizes during the day, i.e., the plant absorbs sun through the day, but grows day and night. And so, it uses some of the nonstructural carbohydrates overnight when it's working or growing, but it's not rebuilding those nonstructural carbohydrates until it gets back into the sun. In the morning, there will be fewer nonstructural carbohydrates.

"Some owners hesitate to fertilize pastures with the assumption that fertilized pastures are going to be higher in nonstructural carbohydrates," said Dr. **Megan Shepherd**. "And that's not the case. Anything we do to stress the plants can increase the nonstructural carbohydrates, so things like drought can be stressful. Soil fertility can be beneficial for keeping nonstructural carbohydrates because anything that promotes plant growth promotes the use of nonstructural carbohydrates and helps to make them lower.

It also might be better to put the horse on pasture early in the morning and use a muzzle grazer or take him off pasture later in the day.



Shutterstock/ BlueRingMedia

Pick the low hanging fruit first, start measuring, stop concentrates, limit ad lib feeding—all those things could improve BSC.

Activity, the horse's temperament and environment are also areas to consider, as is the work the horse does.

Find out what the client's goal is for the horse. Do they want to minimize the risk of laminitis or maintain joint health, for instance, or just have a good looking, healthy horse? The veterinarian can use that information not only to develop a plan but encourage owner participation.

Explore any barriers the client anticipates might make it difficult to implement a weight loss plan. Does the horse feed in a group with other horses? Would separation cause undue stress on the horse?

If the horse can't be taken off pasture, then it might need a grazing muzzle.

Even though calories are being restricted, the horse still needs to meet all its essential nutrient requirements, and maintain satiety and gastrointestinal health, so they might need some supplements, Dr. Shepherd explained.

A safe target to weight loss is 2% of current body weigh in dry matter.

"And the reason for using this safe starting point is because dry matter intake plays a huge role in herbivore and GI tract health," she said. This also helps the horse's mental health because herbivores are meant to eat throughout the day.

Try to get a sense of the types of carbohydrates the horse is consuming, too. The amount of structural and nonstructural carbohydrates varies with the type of pasture. A horse with a history of laminitis might be eating too many nonstructural carbohydrates, which could lead to insulin dysregulation.

If the horse moves through hay quickly, "we need to be really strategic about limiting time between meals," she said.

Slow-feeder nets and other tools can be used strategically for that horse. "If we slow down consumption, we're minimizing time between meals, which is helping to just promote mental health and GI health for this weight loss plan," Dr. Shepherd said.

The horse's weight, muscle mass, body condition and overall health will need regular monitoring until the horse's weight is under control.

And remind owners that it will take time to see results from a smart, healthy weight loss plan.

"The horse didn't get overweight overnight, and they're not going to get to their healthy weight overnight," Dr. Shepherd said. **MeV**

For more information:

Thatcher CD, Pleasant RS, Geor RJ, et al. Prevalence of overconditioning in mature horses in Southwest Virginia during the summer. *J Vet Intern Med.* 2012 Sept. 4 https://doi.org/10.1111/j.1939-1676.2012.00995.x.

https://onlinelibrary.wiley.com/doi/10.1111/j.1939-1676.2012.00995.x

Help more horses get needed care.

A flexible payment solution that works wherever you do.

Whether you're at the barn or the clinic, the CareCredit healthcare credit card can help your clients pay for all of their horse's care. This budget-friendly payment solution comes with an all-digital financing experience that helps make payment accessible anywhere you work.

Horse owners can see if they prequalify (no impact to their credit bureau score), apply, and pay all on their smart device. By helping your clients be financially prepared, you can focus on what's best for their horse. And isn't that why you got into this profession in the first place?

Connecting in the moment of care

CareCredit®
Making care possible...today.

Enroll for free today.

Call 844-812-8111 and mention code MEV2022VA.

Offer ends December 31, 2022.

©2022 Synchrony Bank
MEV2022VA

Diode Laser Safely Reduces Iris Cysts

By Adam Marcus

Diode laser therapy can safely reduce the size of iris cysts in horses, although the treatment is less effective in animals with multiple cysts, thick-walled cysts and cysts incorporated in the corpora nigra in the eye, Dutch researchers have found.

Their study, published recently in Equine Veterinary Journal, showed that use of the lasers was associated with few complications and a low risk of recurrent cysts over both the near and long term.

Emanuël Stas, VMED, of the Department Clinical Sciences, Equine Sciences, Equine Surgery and Orthopaedics at Utrecht University Faculty of Veterinary Medicine, in The Netherlands, said veterinarians frequently overlook iris cysts, which can cause shying or abnormal behavior.

"For veterinarians it is important to also regularly check the eyes of your patients even though the owner comes 'with other problems,' as they might be related" to the lesions," Mr. Stas told Modern Equine Vet. "Secondly, after diagnosing these cysts, it is important for practitioners to know that there is a safe and non-invasive way to treat them."

For the new study, Mr. Stas and his colleagues analyzed case records from 35 horses (46 eyes in all) treated at their institution—the only facility in the country that offers the procedure, he said—for iris cysts using diode lasers between 2008 and 2020. To assess long-term effectiveness, they conducted telephone surveys with the animals' owners and examined photos of the treated eyes if available.

A day after treatment, 35 of the 46 eyes had a "good" response to the laser therapy, while 7 had a "moderate" response, according to the researchers. For 2 cysts, the response was "minimal" or non-existent; for the remaining 2 cases, the result was not in the case reports.

In the vast majority (93%) of cases, the related clinical signs disappeared or diminished after laser treatment with an average follow-up of 19 months, according to the researchers. Recurrent cysts were visible in 2 of the 16 follow-up photographs they received, which had been taken an average of 32.5 months after last treatment.

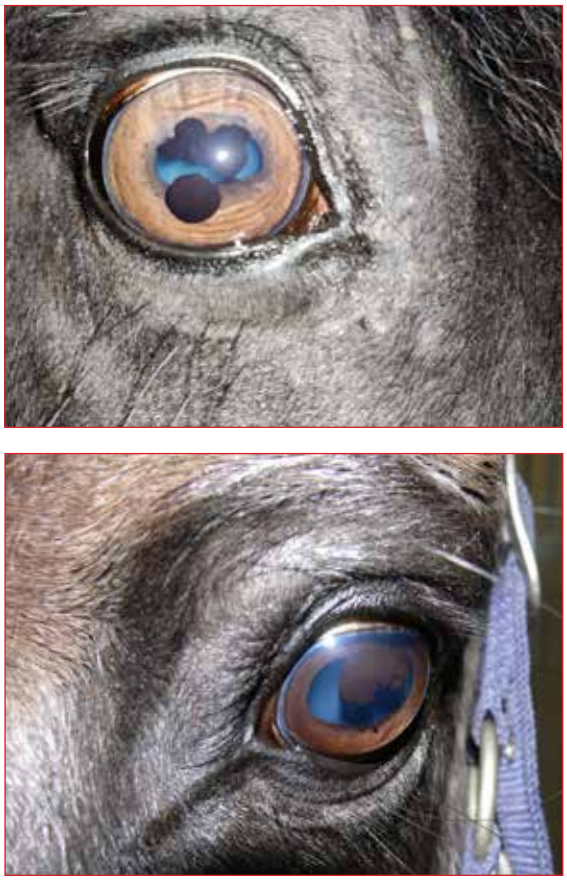


Photo courtesy of Dr. Stas

Two different horses with iris cysts prior to treatment.

More than 80% of owners said they would recommend the procedure, which requires sedation and local blocks rather than general anesthesia and can be performed in 5 to 10 minutes with the animals remaining standing, according to the researchers.

Mr. Stas said he hoped the findings would encourage more equine veterinary clinics to consider using diode laser therapy for iris cysts. The researchers advised using ultrasonography to assess factors that can affect the success of laser treatment, such as thick-walls, multiple cysts and incorporation in the corpora nigra.

"As with all laser treatments, handler experience improves the efficiency and decreases the chances of collateral damage," Mr. Stas said. **MeV**

For more information:

Stas EKL, Hermans H, Slenter IJM, et al. Non-invasive diode laser, an effective and safe treatment of iris cysts in 46 eyes of 35 horses. *Equine Vet J.* 2022 May 16. https://doi.org/10.1111/evj.13590

https://beva.onlinelibrary.wiley.com/doi/10.1111/evj.13590

SO INNOVATIVE...
IT'S LIKE MAGIC

Assure® Guard Gold AND AssureGuard Gold NG

The Ultimate Digestive Aid®

THE REAL MAGIC IS IN THE RESULTS

Together, Assure Guard Gold-NG And Assure Guard Gold Create A Powerhouse Against Your Most Challenging Digestive Cases. Use Assure Guard Gold-NG For Fast Relief And Maintain Excellent Digestive Health With Assure Guard Gold.

Replace your mineral oil, electrolytes, adsorbents, or other treatment options with Assure Guard Gold-NG the only effective and easy to administer slow gelling quick relief formulation including 2 cups of ultra pure psyllium, 72 billion CFU of probiotics, prebiotics, antacids, L-glutamine, electrolytes and energy. For continued support, consider a 10 day supply of Assure Guard Gold after treatment.

ARENUS® ANIMAL HEALTH

Arenus Animal Health | 866-791-3344 | www.arenus.com

Ask your Arenus Veterinary Solution Specialist how Assure Guard Gold-NG and Assure Guard Gold can help your equine patients quickly and effectively recover from the digestive upsets you treat daily.

A Case of *Clostridium botulinum* in a Warmblood Foal

By Megan Born, BT, AAS, LVT, Hagyard Equine Medical Institute
With attending Internists Nimet Browne DVM, MPH DACVIM, and Nathan Slovis, DVM DACVIM, CHT

A 6-week-old Warmblood filly foal was recumbent when it presented to Hagyard Equine Medical Institute, in Kentucky. The only prior treatment implemented at the farm was a dose of flunixin meglumine. The foal's dam remained at the farm.

Physical and neurologic exams, a complete blood count, fibrinogen, chemistry and lactate analysis were performed. An ultrasound examination of abdomen and thoracic regions was performed.

On physical exam the heart rate was 80 beats per minute, respiratory rate was 24 breaths per minute, temperature was 101° F. The foal had pink injected tacky mucous membranes with a capillary refill time of 1 second. Lungs sounds were audible with no crackles or wheezes present. Borborygmi were present in all 4 quadrants.

Her neurologic exam demonstrated ability to vocalize, move front and hind legs, normal anal tone was present, and the ability to move the tail was intact with reduced tail tone. The foal on admission had normal and consensual pupillary light responses. There was normal cranial nerve examination with reduced eyelid and tongue tone. The foal was quiet and responsive but unable to stand without the assistance of 3 hospital personnel.

Ultrasonographic examination revealed no abnormalities other than an enlarged bladder.

Clinical pathology revealed a normal white blood cell (WBC) count of 5.7 K/µL, all erythrocyte counts and indices normal, normal platelet amounts, slightly increased neutrophils and low lymphocytes; lactate in the normal range at 1.1 mmol/L (ref range 0.9–1.7 mmol/L); total protein normal at 6.1 g/dL (ref range 5.7–7.4 g/dL); fibrinogen was normal at 300 mg/dL (ref range 200–500 mg/dL); glucose was slightly elevated at 137 mg/dL (ref range 76–119 mg/dL); lactate dehydrogenase was high at 555 U/L (ref range 112–408 U/L); and creatine kinase was mildly elevated at 634 U/L (ref range 120–320 U/L).

Initial attempts to stand during the first day demonstrated the foal becoming weaker over time. The foal was not able to sit sternal unless supported. The foal was not able to prehend and swallow hay.

Case Differentials and Initial Treatments

Differentials included various types of neurologic diseases, infectious meningitis and trauma. The initial exams and laboratory work did not provide an immediate diagnosis; however, botulism antitoxin plasma was given to prevent further deterioration of the foal if the foal were to have *Clostridium botulinum*. Botulism antitoxin plasma type ABC (manufacturer Lake Immunogenics, NY) was given in the amount of 500 mLs.

A MILA polyurethane antimicrobial 16 gauge long-term guidewire IV catheter was placed for the administration of antibiotics and fluids.

The foal was initially treated with IV ceftazidime due to the initial open diagnosis and its broad antimicrobial spectrum.

Most foals that are recumbent develop pneumonia, which could be caused by either a gram-positive or gram-negative bacterium.

A 14 gauge foley catheter was placed into the bladder to assist with micturition.

Supportive replacement-maintenance fluids with the following additives were administered. Normo-

Photos courtesy of Hagyard

IN A WORLD OF ITS OWN

Aleira®

Researched Respiratory Support

Researched and Proven as an aid in controlling IAD and RAO[1]
Recommended in the ACVIM Consensus Statement on Respiratory Disease[2]

Not all Omega 3's are the same; use the Researched and Recommended 1500mg Purified DHA formulation.
Your Clients Deserve The Best in a Non-Pharmaceutical Solution.

Aleira® – Using the Best Matters

References:
[1] Nogradi N, Couetil LL, Messick J, Stochelski MA, Burgess JA. Evaluation of an Omega-3 Fatty Acid Containing Feed Supplement in the Management of Horses with Chronic Lower Airway Inflammatory Diseases. J Vet Intern Med 2015; 29:299-306.
[2] Couetil LL, Cardwell J.M, Gerber V, Lavoie J.-P, Leguillette R, Richard E.A. Inflammatory Airway Disease of Horses. ACVIM Consensus Statement J of Vet Intern Med 2016; 30:503-515 p. 508-510.

ARENUS® ANIMAL HEALTH

Arenus Animal Health | 866-791-3344 | www.arenus.com

Check with Arenus on how Aleira can help your equine patients effectively cope with respiratory and immune function disorders. See how Aleira can help you to reduce or eliminate pharmaceutical interventions.

Photos courtesy of Hagyard

Foal with *C. botulinum* in the early days of treatment.

The foal standing. Unlike other foals, he did not shake, but general muscle weakness was present.

sol R was administered with dimethyl sulfoxide added due to its anti-inflammatory and diuretic properties. Calcium was also added to the fluids to enhance cellular and muscle function. Dextrose was added to the fluids as a caloric supplement as the mare was kept at home. Vitamin C was added to the fluids for its antioxidant properties.

The foal was placed on restricted oral intake.

The foal was placed on a tempurpedic mattress and turned every 4 hours to prevent lung atelectasis and decubital ulcers.

Artificial tears were placed in the foals' eyes periodically because botulism patients have reduced eyelid tone. Vitamin E was supplemented for its antioxidant properties that can help with nerve injury. Sucralfate was given to prevent ulcers. Orals were later discontinued due to the foal's weakened swallowing ability.

A primary differential of *C. botulinum* was reached based on clinical appearance, exams and behavior over the first 24–48 hours, and therefore, the DMSO was discontinued.

Etiology, Symptoms and Geographic Distribution

C. botulinum in young foals typically occurs after the foal is exposed to the bacteria as it starts foraging. Foals affected by *C. botulinum* are often called "shaker foals" because diseased foals will stand and nurse and after 1-minute start to shake and collapse on the ground without folding their legs normally.

The foal in this case was a bit unlike some of these foals in that it would not shake but the indicative collapse and general muscle weakness was present.

Other clinical signs of botulism are muscle weakness, ileus, respiratory distress, weak eyelid tone, difficulty swallowing, weak or no tongue tone, mydriatic pupils or sluggish pupillary light responses, and in adult horses, failure of the grain test. Cranial nerves are usually affected before other nerves.

A definitive diagnosis is often impossible in single cases. As a result, diagnosis and subsequent treatment of botulism is frequently based on compatible clinical signs, a compatible history of possible exposure to neurotoxin and ruling out other etiologies for observed clinical signs. Definitive diagnosis of botulism requires detection of neurotoxin in feed, serum, gastrointestinal contents or wound debris. Diagnostic tests include the mouse bioassay, ELISA, PCR test and use of an optical-based biosensor. The mouse bioassay (MBA) is the gold standard laboratory diagnostic test for confirming a diagnosis of botulism through the detection of botulism neurotoxin. 30% of adult horses with botulism are reported to have positive test results following culture enrichment using this assay. Recently, a quantitative real-time PCR has been validated for detection of

Foal with *C. botulinum* starts to eat.

neurotoxin genes of *C. botulinum* types A, B & C in equine samples. Higher sensitivities for detection of *C. botulinum* neurotoxin types A, B and C (89%, 86% and 96% respectively) compared with the MBA (81% sensitivity for neurotoxins types A, B and C) have been reported.

Botulism plasma cannot treat the neurons already affected by the toxins; it can only prevent more nerves from becoming affected. If the animal does not succumb to respiratory muscle paralysis or other complications during treatment, the foal can form more neuromuscular junctions over a period of 10–14 days.

Foals that develop inadequate oxygenation and respiratory paralysis can be placed on a mechanical ventilator to expand the lungs and aerate the alveoli properly when the diaphragm is compromised. Adult horses that develop respiratory inadequacy are usually euthanized due to the inability of mechanical ventilators to support long term ventilation of large animals. Adult horses that are recumbent for more than a few days are at a higher risk for mortality from developing debilitating myopathies, pneumonia, and ileus.

There are several toxins associated with *C. botulinum* with A, B, and C being the most common in horses. Type B is the most prevalent of the three types with reportedly over 80% of cases being type B cases. The *C. botulinum* toxoid vaccine protects against botulism type B. There are no vaccines for types C and A. Type B is found in most regions of the United States, type C in prevalent in Florida, and type A is found in Western United States such as California, Idaho, and Oregon.

A conservative estimate of approximately 150–250 horses are infected with botulism per year, which is higher than the human case rate at approximately 110 cases per year.

Progression of Recovery

The day after admission, the foal had reduced muscle tone in the neck, distal limbs and no tail tone. The foal would move its legs but be unable to sit in sternal. Respiratory rate was 40 bpm with more effort. Although she was able to swallow a little water, hay was restricted due to reduced deglutition ability. The foal was not defecating voluntarily and required enemas twice daily. A second 500 mL bag of IV ABC botulism plasma was given. The foal was still getting its recumbency changed every 4 hours and standing the foal was temporarily suspended to help preserve acetylcholine. Ceftazidime was discontinued once meningitis was no longer suspected. Creatinine kinase and alkaline phosphatase remained high and electrolytes, CO_2, and other bloodwork parameters were within normal limits.

Foals that develop inadequate oxygenation and respiratory paralysis can be placed on mechanical ventilation to aerate the alveoli.

Two days after admittance, intranasal oxygen insufflation was begun at a rate of 8 L/min. Ampicillin was added to the treatment regimen to help treat the botulism, which is susceptible to penicillin and to help prevent the foal from developing pneumonia. Total IV nutrition in a 3 L bag with 70% dextrose (125.300 gm/L), 10% amino acids (Travasol 33.300 gm/L), and 20% lipids (Intralipid 25 gm/L) and water (363 ml/L) was started at a rate of 50 mL/hr then gradually increased to 150 ml/hr as glucose levels remained within normal range. The heart rate (bpm) de-

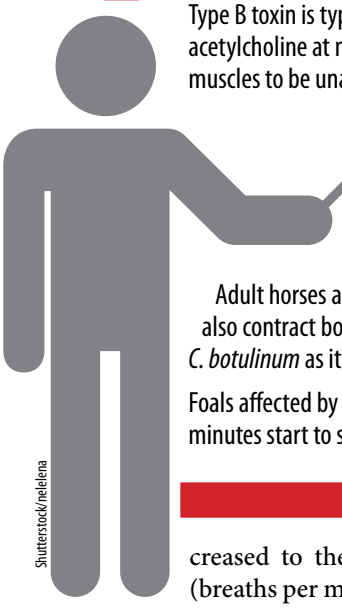
Teaching Points

C. botulinum in young foals typically occurs after the foal is exposed to the bacteria as it starts foraging. In human babies and young animals with an immature gastrointestinal microbiota, the bacteria can germinate in the GI system. Type B toxin is typically implicated. Once these spores germinate, they can produce toxins that cause the inhibition of acetylcholine at neuromuscular junctions. The most common form results in the inhibition of acetylcholine which causes muscles to be unable to contract. It is important to note that only motor nerves are affected by *C. botulinum*. An affected foal still has sensory nerves and has the will to move or behave normally. Young foals usually younger than 3 months have an immature intestinal microbiota that can allow these spores to germinate and proliferate in the gastrointestinal tract.

Older horses have a more mature intestinal microbiota and intestinal pH that are inhibitory for the spores to germinate in the intestinal tract.

Adult horses and older foals must ingest toxin that is already formed in the forage to contract the disease. Horses can also contract botulism from toxin formation in deep penetrating wounds. Puncture wounds can cause bacterial growth of *C. botulinum* as it multiplies well in an anaerobic environment.

Foals affected by *C. botulinum* are often called "shaker foals" because diseased foals will stand and nurse and within minutes start to shake and collapse on the ground without folding their legs normally.



Shutterstock/nelelena

creased to the 60s from the 80s. Respiratory rate (breaths per minute) decreased to the 20s after intranasal oxygen was initiated. All oral medications were discontinued. Neopolybac was started to treat superficial eye ulcers. Epidermal abrasions were treated with silver sulfadiazine. Amino acids and dextrose were discontinued from the crystalloid fluids after TPN was initiated. The foal showed hyperesthetic behavior and could not sit sternal. The foal exhibited a low WBC count of 3.6 K/L, bands were high at 7% of the total WBC count, lactate dehydrogenase was still increased, alkaline phosphatase was still elevated. Lymphocytes were analyzed at lower than normal. The client was informed that the prognosis for full recovery is usually good (85%) if the foal does not develop a severe pneumonia or have to be placed on a ventilator. However, they would be investing at least $1,000 per day.

Three days after admission, the foal improved slightly and could sit in sternal for 30 minutes on its own. Pupillary light responses were improving, and the foal was interested in trying to eat although oral ingestion was still restricted. The TPN was maintained at a rate to provide the foal with approximately 70% of its caloric needs. The foals CO_2 was slightly elevated at 39 mEq/L (ref range 25-32 mEq/L). Total protein, hematocrit, lymphocytes, chloride, and creatine were all slightly lower than normal ranges.

On the fourth day after admission, the foal was stood with assistance when turning and the foal was able to support some of its own weight for 2 minutes before collapsing. The foal was able to defecate with an enema assistance. Red blood cell indices were low. The rest of the bloodwork was similar to the previous day. Triglycerides were measured and found to be slightly high at 58 mg/dL (ref range 13–55 mg/dL). Ammonia levels were measured and found to be normal. Potassium penicillin was started and ampicillin was discontinued. Flunixin meglumine was removed from serial administration.

Three days after admission, the foal improved slightly and could sit in sternal for 30 minutes on its own. Puplillary light responses were improving, too.

On the fifth day another ultrasound examination of the lung fields was performed and comet tails were visualized with small areas of consolidation. Nebulization was started with Ceftiofur and Albuterol to bronchodilate

and deliver antibiotics directly into the lower airways. Intranasal oxygen was still at a rate of 8 L/min. The foal was able to pass manure on its own. CO_2 levels were still just slightly over normal limits.

Over the next 2 days, the foal—with assistance from up to 3 people—remained standing for up to 6 minutes with support. The foal took a few steps. She swallowed water without observable difficulty. Oxygen insufflation was reduced to 6 L/Min. Ocular neopolybac was changed to artificial tears as the corneal surface lesions had resolved. Bloodwork remained similar with no concerning changes. A serum amyloid assay was done to detect early signs of pneumonia, and the value was normal.

Seven days after admittance, the foal was started on 1/4 lb. of Wellsolve gel orally every 8 hours. The foal was assisted to stand every 2 hours instead of every 4 hours and was still able to remain up for approximately 5 minutes each time. The foal walked short distances. Nebulization was reduced to BID instead of QID treatments. Bloodwork was unremarkable other than total protein being just under the reference ranges.

On the 8th day after presentation, the foal was able to eat a senior type feed, soaked hay fines, and drink some water. Wellsolve gel was discontinued, and the urinary catheter was removed.

Over the next few days, the foal continued to improve, and total parenteral nutrition was discontinued. The IV catheter was removed. She could be turned out to the paddock for short times with support walking out. The foal was staying up for 15 to 30 minutes at a time. The pneumonia was improving, and the foal was able to eat hay and sweet feed. Laboratory work remained fairly normal.

The foal stood without encouragement or assistance on the 14th day after admission and was staying up without assistance for 30 minutes at a time.

The foal was discharged to the farm on the 15th day after arrival. The clients had milked the mare during this time to maintain milk production, and the foal was able to nurse from the dam without difficulty.

This case demonstrated the successful treatment of a foal diagnosed with *C. botulinum*. The clients invested a significant amount (~$17,000) for the 24-hour intensive care this foal required during 14 days of recovery. The coordinated effort of approximately 12 veterinarians and 15 to 20 technicians contributed to the intensive care, diagnostics, monitoring and supportive treatments, which prevented morbid complications of the disease processes of equine botulism. **MeV**

About the author

Megan Born, BT, AAS, LVT, is a technician in the Internal Medicine and Critical Care department at Hagyard Equine Medical Institute. She is also a graduate student in the University of Missouri's distance Masters of Veterinary Science program. In her spare time she enjoys showing reining horses, playing the violin, and attending Clays Mill Baptist Church.

Survey: More Species Threatened Than Thought

An estimated 30% of species have been threatened or driven extinct since 1500 AD, according to a new survey.

"Experts also acknowledged substantial uncertainty around their estimates, with perhaps as few as 16% or as many as 50% of species threatened or driven extinct over this time." said **Forest Isbell**, PhD, an associate professor in the College of Biological Sciences at the University of Minnesota, who reviewed 3,331 responses from scientists studying biodiversity in 187 countries.

The study also identified important demographic and geographic differences in experts' perspectives and estimates. The researchers encourage biodiversity experts to use these results to ensure that a range of perspectives is included when conducting global biodiversity assessments, setting global biodiversity goals and targets, and making the new policies and other transformative changes needed to conserve biodiversity.

"Since biodiversity is highly regional in nature, the attempt of our study to bring together the opinions of regional experts from around the world is unprecedented," said co-author Akira Mori of the University of Tokyo in Japan. "From the perspective of social and cultural diversity and inclusiveness, even if they are not necessarily complete, I believe we have presented certain suggestions for future international policy discussions."

The experts believe that greatly increasing conservation investments and efforts now could remove the threat of extinction for 1:3 species that may otherwise be threatened or extinct by 2100. **MeV**

For more information:

Isbell F, Bealvaera P, Mori AS, et al. Expert perspectives on global biodiversity loss and its drivers and impacts on people. *Font Ecol Environ.* 2022 Jul 18.

https://esajournals.onlinelibrary.wiley.com/doi/full/10.1002/fee.2536

Equine Hepatitis Viruses Improves the Understanding of Human HCV

CHECK OUT
"Managing Novel and Puzzling Equine Hepatitis" in the June 2022, issue of *Modern Equine Vet*.

Horses with viral hepatitis may serve as an animal model for researchers looking for a vaccine against hepatitis C virus (HCV) in humans. Research is being done to compare the viruses found in humans and horses to see why HCV is more likely to progress to liver failure and cancer than equine hepatitis viruses are.

More than 70 million people worldwide are infected with HCV. The disease is treatable, but it is often not recognized. In 80% of cases, it becomes chronic and can lead to liver damage and cancer. So far, there is no effective vaccine.

"The reason why the disease often doesn't clear up is that the virus is constantly changing and thus escapes the immune system," explained **Daniel Todt**, a member of the molecular & medical virology Faculty at the Medicine Ruhr-Universität Bochum in Germany. "The immune system forms antibodies that always lag behind the virus for a while and have the ability to combat a variant that was in the body about 2 weeks before."

This evolution of the virus within the host is therefore of particular interest to the researchers.

To date, there have been no suitable animal models to deal with these questions in animal experiments. In their quest for a surrogate model for research into the human HCV, the scientists analyzed samples from horses that were taken in cooperation with the University of Veterinary Medicine Hannover (TiHo).

"If you compare hepatitis viruses that can infect different species, it is striking that the human virus and the virus that is infectious for horses are genetically close relatives," explained **André Gömer,** a doctorate student at the TiHo Research Training Group VIPER and lead author of the paper. The researchers analyzed the surface proteins of viruses from humans and horses in the course of infection and compared the results.

"In the horse virus, a region that we call hypervariable is missing. It changes particularly quickly and protects an area of the virus that helps it infect host cells," Mr. Gömer said

"These findings help us to better understand the tactics of the hepatitis C virus and to find out which areas of the virus are the most relevant," Dr. Todt added.

The equine hepatitis virus infection of horses could represent a powerful model to gain insights into hepaciviral evolution and HCV immune evasion. **MeV**

Courtesy of Ruhr-University Bochum, Marquard

Daniel Todt and André Gömer (right) propose a new surrogate model for hepatitis C.

For more information:

Gömer A, Brown RJP, Pfaender S, et al. Intra-host analysis of hepaciviral glycoprotein evolution reveals signatures associated with viral persistence and clearance. *Virus Evolution*. 2022;8(1) DOI: 10.1093/ve/veac007

ALL OTHERS FALL SHORT.

Assure® Guard Gold
The Ultimate Digestive Aid®

**The Trusted Solution of Equine Veterinary Professionals.
Researched and Patented for the treatment of Recurrent Colic, Chronic Diarrhea, Dysmotility and Ulcers.**

ARENUS® ANIMAL HEALTH

Arenus Animal Health | 866-791-3344 | www.arenus.com

Ask one of our Veterinary Solutions Specialists how Assure Guard Gold and the new Assure Advisor Mobile App can help you guide your patients to improve digestive health.

Faults in Show Jumpers Might be Predictable

Faults during show jumping events are driven by several different factors, including course length, arena surface, whether it is held indoors or outdoors, as well as, the experience and skill of the riders. A rivalry between riders also seems to drive faults, according to a recent study from the Czech Republic.

The researchers reviewed videos from 144 riders who jumped a total of 222 horses in 13 Western European League competitions. The elite competitions were held between 2017 and 2018 and looked at the first round and jump off. During the season, the horses jumped 9,114 jumps over 320 obstacles within 504 starts in first rounds of competitions and 141 starts in jump offs. The obstacles included oxers, oxers with water, triple bars, verticals, verticals with water and walls.

The researchers found that faults occurred more often at certain types of fence and their location in the course. The overall fault rate—a downed bar or refusal—was 7.85%, of these 8.12% occurred in the first round.

Many Factors at Play

Many factors played into the faults, however, the most faults occurred when jumping a vertical with water, and the least number of faults occurred when jumping a triple bar and wall, the researchers said. In both rounds, combinations led to the highest number of faults with the highest probability being on the first or second fence of a double obstacle.

Experience definitely played a role, with riders in subsequent competitions having fewer faults. "Riders' experience could be associated with a better estimation of jump effort and easier adaptation to various courses of competitions, as well as with a better-balanced position during the jump compared to the less experienced riders," the researchers wrote, adding that experience and education can also reduce rider injury.

"Other factors, such as the height, number and type of the obstacles, arrangement of fences, approach line, horse age and breed, or rider impact were associated earlier with faults in show-jumping competitions," the researchers wrote.

"This suggests that faults are driven by various factors in different kinds and difficulty of competition, including different lengths of the course, the surface of the arena, the location of competitions (outdoors/indoor) or psychological factors such as rivalry of the riders." **MeV**

A horse show-jumping in Germany.

Credit: Markus Spiske, Unsplash, CC0

For more information:

Ničová K, Bartošová J. Still beyond a chance: Distribution of faults in elite show-jumping horses. *PLoS ONE 2022* Mar 16. March 16, 2022. https://doi.org/10.1371/journal.pone.0264615

https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0264615

DON'T LEAVE YOUR BREEDING PROGRAM UP TO CUPID

Releira®

The only product researched to improve conception rates in difficult to breed mares.

Take your breeding program to the next level with this research-backed Omega-3 formula providing reproductive health benefits for mares, stallions, and foals. Releira addresses common fertility issues with a readily absorbed, vegetarian algae source.

Not only reduce the cycles to conception for your difficult mares but improve semen quality in those stallions with morphology and motility issues. Research proven to improve cognitive abilities in the newborn foal.

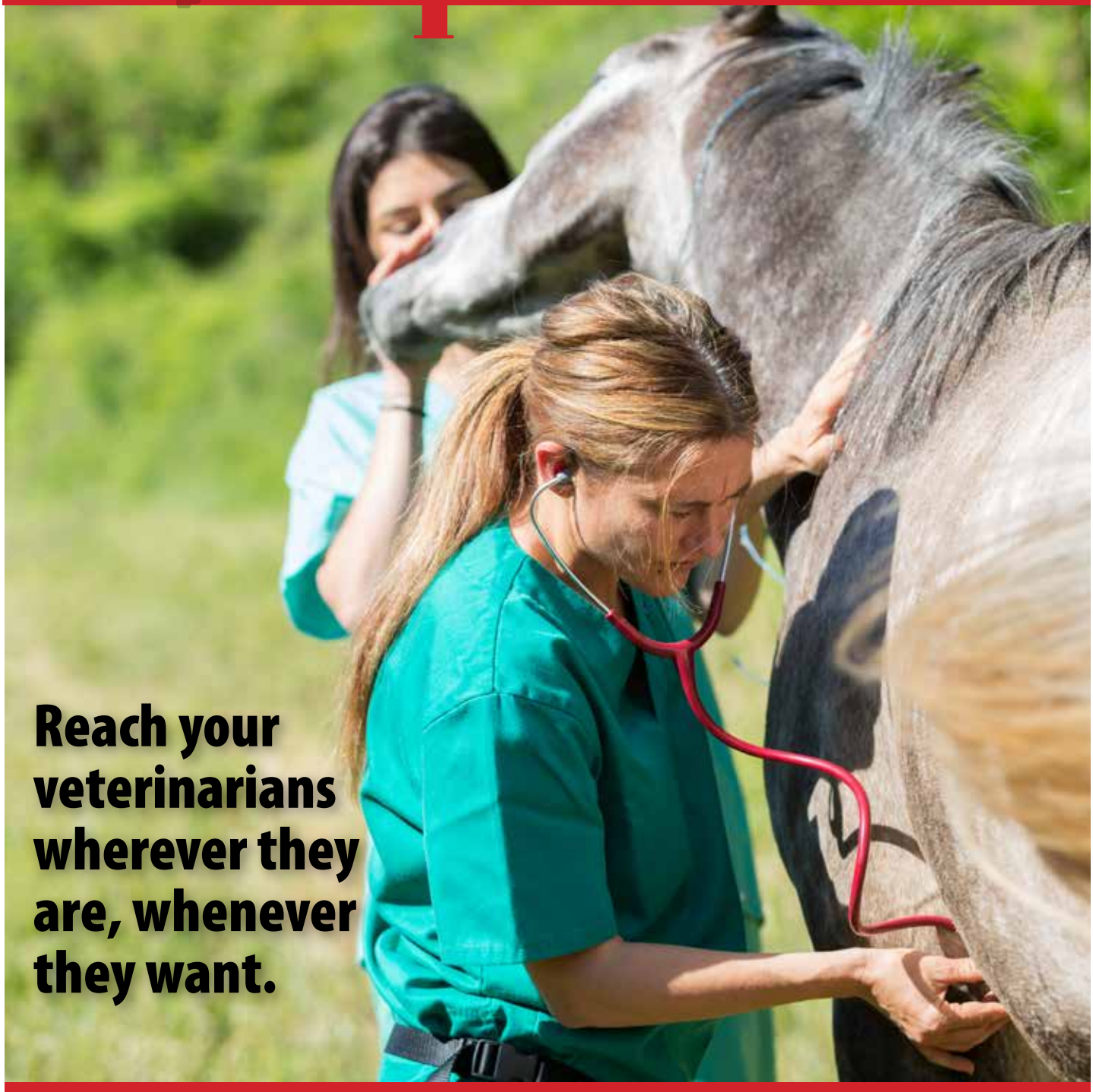
References:
[1] Brendemuehl JP, Kopp K, Altman J. Uterine Inflammatory Response to Frozen Semen is attenuated by Oral Supplementation of a Blend of Omega-3 Fatty Acids (Algal DHA and Flax Seed) in Susceptible and Resistant Mares. Submitted to Theriogenology. [2] Brendemuehl JP, Altman J, Kopp K. Influence of dietary algal N-3 fatty acids on breeding induced inflammation and endometrial cytokine expression in mares bred with frozen semen. J Equine Vet Sci. 2014; 34(1): 123-124. [3] A.M. Adkin, A.V. Muniz, C.J. Mortensen, L.K. Warren. Maternal fatty acid supplementation influences memory and learning ability in yearling and 2-year-old horses. J Equine Vet Sci. 2015; 35: 418-436. [4] A.M. Adkin, L.K. Warren, C.J. Mortensen, J. Kivipelto. Maternal supplementation of docosahexaenoic acid and its effect on fatty acid transfer to the foal (longitudinal study). Equine Vet Sci. 2013; 33: 321-329. [5] A.M. Adkin, L.K. Warren, and C.A. McCall. Effect of maternal docosahexaenoic acid supplementation on behavior and cognitive development in nursing foals. J Equine Vet Sci. 2013; 33: 321-399.

ARENUS® ANIMAL HEALTH

Arenus Animal Health | 866-791-3344 | www.arenus.com

Ask your Veterinary Solution Specialist how Releira can take your patient's breeding program to the next level.

The Modern Equine Vet



Reach your veterinarians wherever they are, whenever they want.

FOR ADVERTISING RATES AND INFORMATION, EMAIL
For advertising rates and information, email ModernEquineVet@gmail.com