The Modern Equine Vet

www.modernequinevet.com

Vol 12 Issue 6 2022

Managing Novel Equine Hepatitis

A Horse of a Different Color

Are You a Horse Whisperer?

Tech Update: Acute Neonatal Isoerythrolysis

CHECK OUT OUR SPONSORED CONTENT

IDENTIFYING COMMON EYE INFECTIONS | FINANCIAL SOLUTIONS FOR CLIENTS

TABLE OF CONTENTS

4 **COVER STORY**
Managing Novel and Puzzling Equine Hepatitis

Cover: Shutterstock/Julia Siomuha

GENETICS

Novel Mutation Found in Standardbred Horse 10
Some Sight for Sore Eyes 22

TECHNICIAN UPDATE

Caring for a Foal With Severe, Acute Neonatal Isoerythrolysis 16

NEWS NOTES

Changes Seen Among Practitioners, but More Needed to Fight Antimicrobial Resistance 15
Are You a Horse Whisperer? 24

SPONSORED EDITORIAL

"How Do I Help Clients Identify Early Signs of Common Infectious Diseases of the Eye?" 3
My Clients Already Have Credit Cards. Why Should I Bother with a Financing Solution? 9

ADVERTISERS

Merck Sponsored Content 3
American Regent/Adequan 7
CareCredit Sponsored Content 9
Arenus Animal Health/Assure Gold 11
Shanks Veterinary Equipment 12
American Regent/BetaVet 17
Arenus Animal Health/Aleira 15
Merck Animal Health 19
Arenus Animal Health/Assure Gold 23
Arenus Animal Health/Releira 25

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.

ASK THE Infectious Disease Expert

This column, brought to you by Merck Animal Health, features insightful answers from leading minds.

"How do I help clients identify early signs of common infectious diseases of the eye?"

Infectious processes in the eyes of the horse usually begin with an ophthalmic injury. A horse's eyes are susceptible to injury because of their exposed location on the sides of the skull. When you add in the horse's strong flight response that can lead to a lot of injured ocular structures. Damaged eye tissues are at a high risk of infection from bacteria and fungi because the eye's normal defense mechanisms are often breached when injured.

Multiple parts of the eye can become infected, but the cornea is the most commonly affected structure. Corneal infection — whether bacterial or fungal — can be superficial or deep depending on which layers of the cornea are infected. Many species of fungi and some *Streptococcus* species are more likely to migrate deep into the cornea, increasing the risk of vision loss or loss of the globe entirely.

If a horse sustains a corneal injury, ensure your clients understand that preventing infection is the best way to increase the likelihood of preserving vision. For this reason, uninfected superficial corneal ulcers are routinely treated with topical antimicrobial medications and monitored closely.

TREATING CORNEAL INFECTIONS

Infectious processes of the cornea include infected superficial or deep corneal ulcers and stromal abscesses. Signs of infection include:

- Loss of corneal structure (i.e., ulcer getting deeper or larger in surface area)
- Advancing corneal blood vessels

- Worsened or persistent ocular pain illustrated by squinting, tearing and resistance to touch near the eye.

With a stromal abscess, intact corneal epithelium covers the infected tissue. This intact epithelium renders some topical antimicrobial medications ineffective because they are unable to cross the barrier to reach the infection. Thankfully, there are multiple topical antimicrobial medications that can cross intact corneal epithelium, including fluoroquinolones, chloramphenicol, voriconazole and itraconazole if it is combined with DMSO.

PRACTICE TIP: A horse can experience both a stromal abscess and a corneal ulcer at the same time. Don't rule out a stromal abscess simply because there is an adjacent area of fluorescein stain uptake. Determining whether an area of corneal opacity is dense edema or cellular infiltrate can be difficult. If unsure, it is better to treat with a medication that can cross intact epithelium.

For some horses, treatment with topical ophthalmic medications may be difficult — even dangerous — particularly if horses have a very painful ocular condition like a corneal infection. Also, because a constant production of tears washes over the surface of the eye, it is necessary to topically treat an eye multiple times a day, sometimes as frequently as every one to two hours in severe cases. Placing a subpalpebral lavage (SPL) system in the affected eye facilitates safe and effective treatment and improves treatment outcomes.

EFFECTIVE CLIENT COMMUNICATION

Counsel your clients to call you for an urgent examination when they notice signs of any ophthalmic problem, because untreated infections can progress rapidly. General signs of an eye problem include:

- Squinting
- Tearing
- Redness and/or swelling of the conjunctiva and eyelids
- Areas of color change within the cornea (any white, yellow, blue, green or red coloration of the normally clear cornea).

Ensure clients understand that they should not treat their horse's eye with any topical product until you examine the horse, because certain medications may be contraindicated.

Being aware of common infectious diseases of the eye will help you better serve your patients and clients. By educating horse owners on how to identify early signs of infection, you'll help more horses see their way to a healthier life.

ABOUT THE AUTHOR

Chrissie Schneider, DVM, MS, DABVP (equine practice), cVMA, is a senior equine professional services veterinarian with Merck Animal Health. Before joining Merck, Schneider was a clinical instructor in Ohio State University's Equine Field Service, then worked at Bella Vista Equine Veterinary Services in Blacklick, Ohio, where she focused her practice on preventive care, routine dentistry, emergency medicine and ophthalmic care on the farm.

WANT TO ASK A QUESTION? EMAIL THE EDITOR.

For more information, visit https://www.merck-animal-health-usa.com/species/equine.

Copyright © 2022 Merck & Co., Inc., Rahway, NJ, USA and its affiliates. All rights reserved.

Managing NOVEL AND PUZZLING Equine Hepatitis

Although there is a good amount of ongoing research studying equine hepatitis viruses, they can be tricky to diagnose, according to **Joy Tomlinson,** DVM, DACVIM, a research associate at the Baker Institute for Animal Health at Cornell University College of Veterinary Medicine, in Ithaca, NY.

There is no vaccine nor specific treatment for these equine conditions.

Originally four viruses—pegivirus E and D, equine parvovirus-hepatitis (EqPV-H) and equine hepacivirus (EqHV)—were thought to cause equine hepatitis, but today it is generally accepted that only EqPV-H and EqHV cause infectious hepatitis in horses.

EqPV-H causes Theiler's disease or mild-to-moderate acute hepatitis, and EqHV causes mild acute and mild-to-severe chronic liver disease in horses, according to Dr. Tomlinson, who has been studying equine hepatitis for some time.

Research has confirmed that the 2 pegiviruses are not associated with liver diseases, and Cornell has removed them from the equine hepatitis polymerase chain reaction (PCR) panel, explained Dr. Tomlinson.

Theiler's Disease

Theiler's disease is a rare, but highly fatal form of acute liver failure that has been associated with equine biologic products, such as tetanus antitoxin, plasma or allogenic stem cells. However, cases do occur without a history of receiving a biologic product.

"Horses are sometimes found dead in the field having been normal at the last check, or often they present already with overt hepatic encephalopathy," Dr. Tomlinson said.

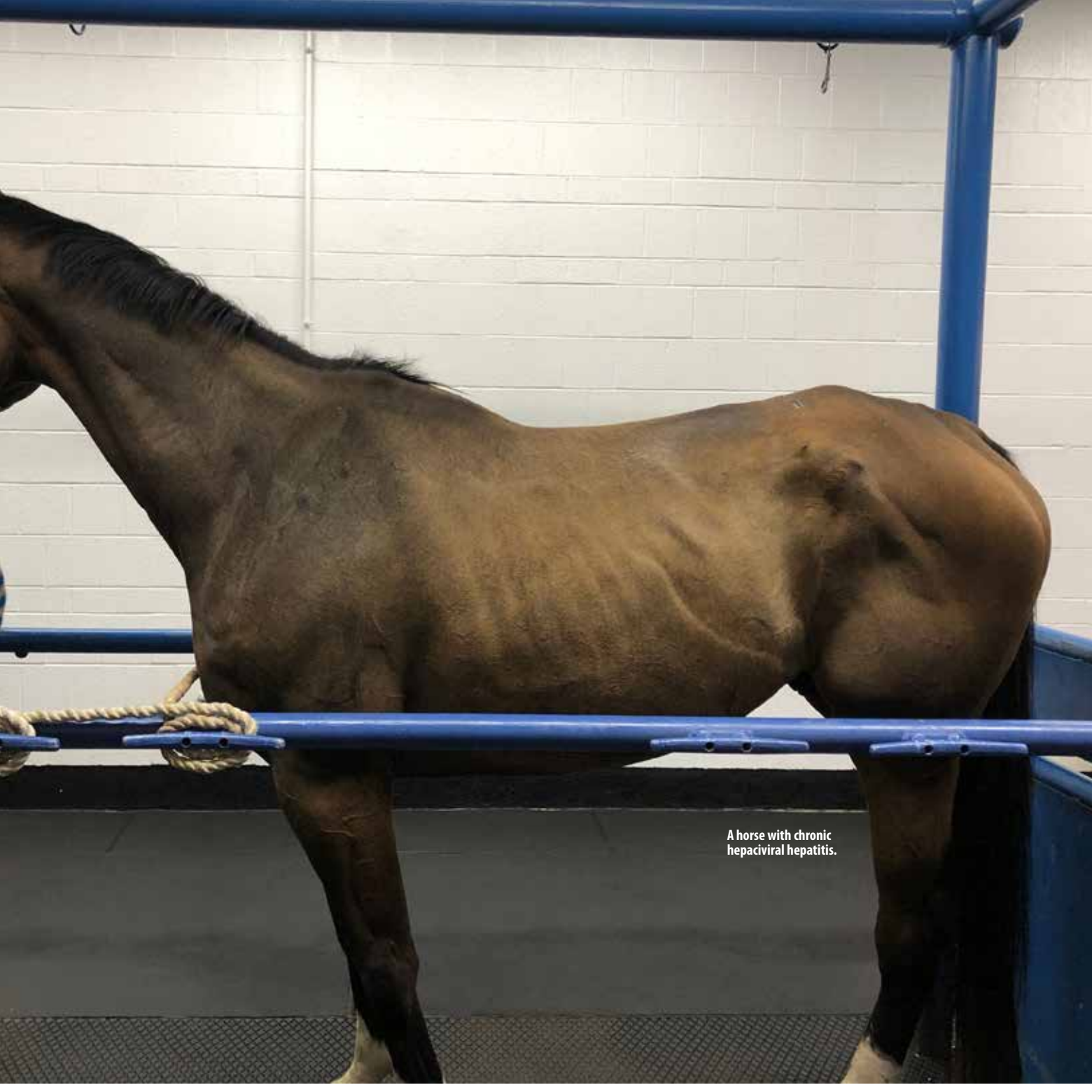
They often have a history of having received a biologic product about 4 to 12 weeks before the episode. Cases without a biologic treatment history frequently cluster in the summer and fall and may lead to outbreaks on farms.

"Because of this history, the condition has long been known to be both transmissible in these biologic products, as well as contagious between horses," Dr. Tomlinson explained at the 67th Annual Convention of the AAEP, held in Nashville, Tenn.

"And so, we've always thought it could be a viral cause, but for over 100 years, no one was able to culture a virus."

Cornell's **Tom J. Divers,** DVM, and **Bud C. Tennant,** DVM, were able to sequence the novel parvovirus that causes Theiler's disease in 2018. Of the 28 Theiler's disease cases over 4 years seen at Cornell, 18 had received a biologic product, and 10 had not, according to Dr. Tomlinson.

By Marie Rosenthal MS



A horse with chronic hepaciviral hepatitis.

Images courtesy of Dr. Joy Tomlinson

"And we did find parvovirus infection in 27 of those 28 cases. This is pretty convincing evidence that this virus is the cause of Theiler's disease, but I wasn't satisfied," she said.

She continued to research the disease.

"We found that the vast majority of infections with equine parvovirus are subclinical or mild clinical hepatitis," she said. The horse might be a little bit icteric and lethargic and, perhaps, be off its feed.

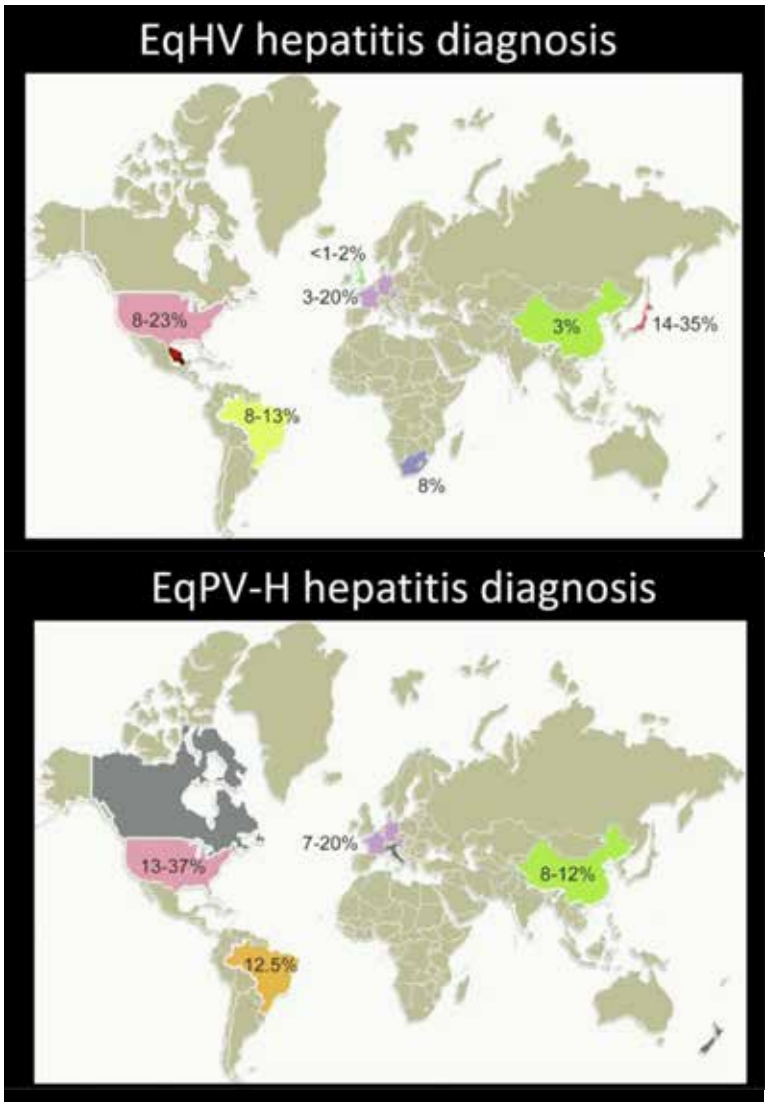
"Importantly, even though it is a viral disease, it is not associated with fever," Dr. Tomlinson said.

A horse with fulminant hepatitic necrosis, i.e., Theiler's disease, can be diagnosed with a serum or liver PCR used with a history, clinical signs, clinical pathology and histopathology.

"We don't have immunohistochemistry yet for this virus, but we do offer in situ hybridization, which labels the viral DNA," she said.

However, mild or subclinical cases are harder to tease out.

There tends to be a prolonged period of viremia, which can last from 5 to 8 weeks, before the onset of hepatitis. In fact, the onset of hepatitis does not occur until after the immune response, and the viremia



Rates of equine hepacivirus and parvovirus around the world. (The grey denotes cases reported, but rates are unknown.)

falls. Low levels of viremia can persist in these horses for months to years after infection.

"They tend to not completely clear the virus," Dr. Tomlinson said.

"If we talk about trying to diagnose parvoviral hepatitis, we run into a similar problem that we see with EPM and Lyme disease, which is that it is a highly prevalent virus."

From one-quarter to one-third of U.S. horses are PCR-positive at any time. "So, a single positive PCR does not mean that the episode of hepatitis that you're seeing is caused by that virus," she said.

One of the areas she is working on is to develop better diagnostic criteria for these cases.

Because there may not be overt clinical signs, owners might not contact the veterinarian until that later stage, when viremia is low. "And then you're left with primarily ruling out other causes saying it is parvo-positive, and the horse is getting better. So, it's presumptively a parvoviral hepatitis," she said.

Stopping Transmission

Because biologic products have been associated with transmission, the Department of Agriculture (USDA) has updated regulations to make sure that biological products are tested, and transmission from such products is down.

"But if you have a blood donor herd or you're taking allogenic stem cells or doing any sort of homemade biologic products, you should be testing your donors and your products," she cautioned.

Horses do shed virus through oral, nasal and fecal secretions for many weeks after infection, and shedding starts before the onset of hepatitis.

"I have been able to transmit the virus by nasal inoculation quite efficiently. However, there's this prolonged phase of 6 to 19 weeks before they become viremic, and this means that any sort of quarantine or biosecurity practices are going to be extraordinarily difficult to manage," Dr. Tomlinson said.

Equine Hepacivirus

Where EqPV-H is the story of acute hepatitis, EqHV is the story of a chronic hepatitis concern. EqHV is a close genetic relative of hepatitis C virus (HCV), and it has garnered interest as an animal model.

HCV in people is an interesting condition because some people can clear the virus effectively, but many have a persistent infection for many years, and over that time, they develop liver fibrosis, cirrhosis and cancer. There are treatments for HCV, but they are extraordinarily expensive.

"When we look at horses with equine hepacivirus, we see a similar pattern of diseases," Dr. Tomlinson said. Horses tend to have this prolonged viremia of a few months, and then they will clear the virus spontaneously and have mild, subclinical hepatitis at the time of viral clearance.

"So, you wouldn't be picking these up as clinicians, and the horses don't care either. They're not sick, there's no fever. There's nothing really wrong with them. If you biopsy these horses during that acute hepatitis, you'll see similar findings to the mild parvovirus cases," Dr. Tomlinson said.

One would see individual hepatocyte necrosis with lymphocytic infiltrate and sometimes fewer neutrophils in EqHV that resolves.

About 80% of people who have HCV develop a persistent infection, but for most it's a mild disease. Only about 10% develop severe chronic hepatitis cirrhosis or cancer.

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 cycle

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.
© 2021, American Regent, Inc.

PP-AI-US-0629 05/2021

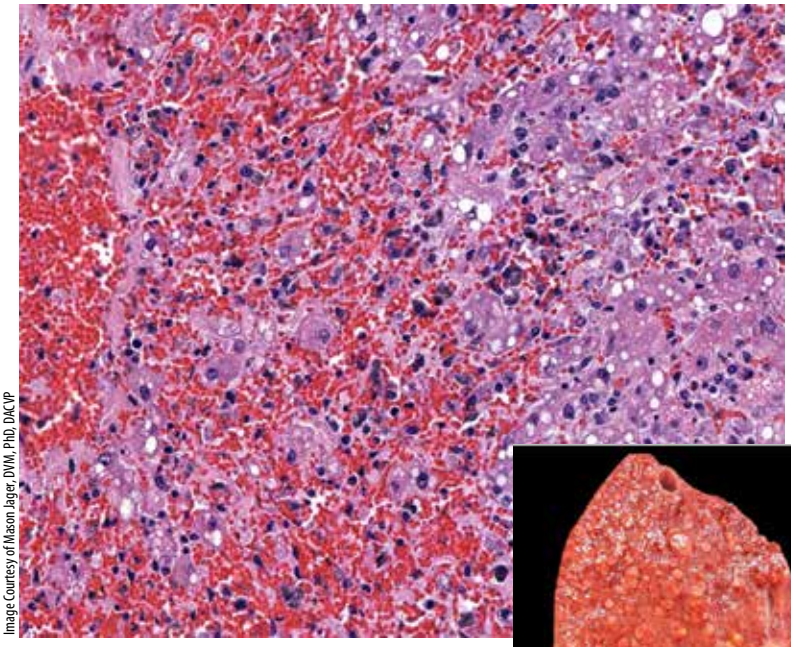
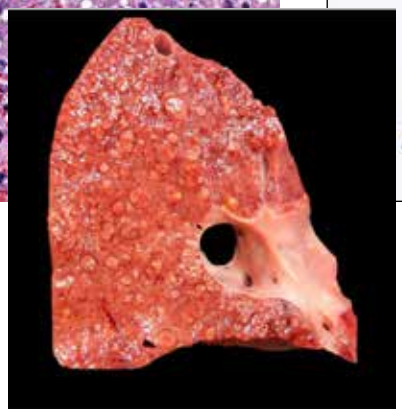
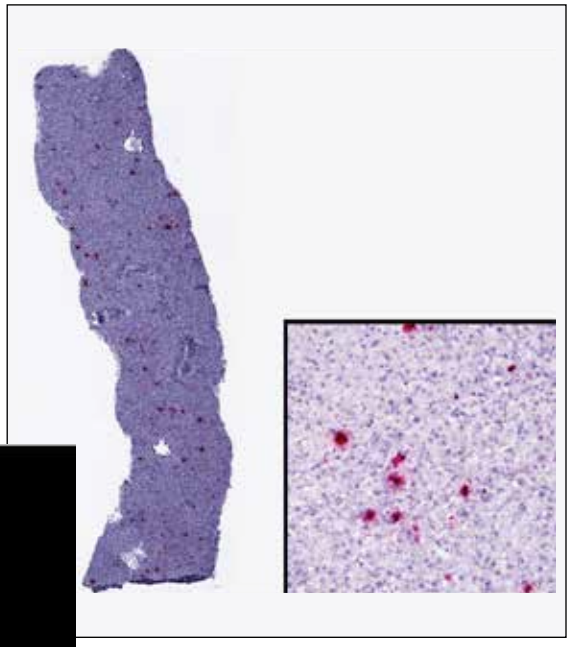


Image Courtesy of Mason Jager, DVM, PhD, DACVP



Above: Histopathology of a Theiler's disease case. There has been massive hepatocyte necrosis, with red blood cells filling the areas of hepatocyte loss.

Right: The nodular appearance of the liver of a horse with chronic hepaciviral hepatitis and cirrhosis.



Above left: Liver biopsy of a horse with moderate parvoviral hepatitis. EqPV-H DNA is labeled in pink, showing moderate proportion of cells affected. The level of infection on histopathology appears to correlate with severity of clinical signs. Liver biopsy labeled with in situ hybridization. From, Tomlinson et al. *Emerg Microbes Infect* 2020 Mar 20. https://www.tandfonline.com/doi/full/10.1080/22221751.2020.1741326

About 20% of horses develop persistent infection, and it is unknown how many develop chronic disease. "What we do see though is increasing evidence that some of them do," she said.

Although many of the ultrasounds are fairly normal in these chronic cases, liver fibrosis does develop.

She has been following several horses with chronic EqHV for 2 years. Some are milder without functional deficits and persist without progressing for a while. Others have more severe disease with high bile acids, functional deficits and mild hepatic encephalopathy. Many have a high packed cell volume, which is not responsive to fluid therapy.

The diagnosis is going to rely on a pattern of disease. A liver biopsy might help, but the results are not consistent, she warned. Instead, look at the time line.

"If you have a mild acute hepatitis, you should see that falling viremia and you should see them clear the virus as they recover from the hepatitis. This can take weeks to a couple months for all the liver enzymes to be completely back to normal in the acute cases."

Chronic cases will have persistently high liver enzymes.

"I don't have any better way to say that it's definitely persistently infected with hepacivirus than to follow the horse for at least 6 months, if the horse survives that long," Dr. Tomlinson admitted.

So, it is important to rule out other differentials. If the liver problem is caused by another problem, such as a bacterial infection, "you are not doing that horse any favors" if it is not found early.

Areas of research are whether horses shed virus and when, and whether there is some type of vector, such as a mosquito, that can account for the cases that are not related to biologic products.

"Equine parvovirus and equine hepacivirus are both highly prevalent viruses. They've both been looked at, and they both have similar infection rates. Parvovirus causes acute hepatitis that can be completely subclinical to fatal, and hepacivirus causes either subclinical acute hepatitis or anywhere from subclinical to fatal chronic," she said.

Both can be diagnosed by PCR and serum biochemistry, but serial testing will be needed. Biopsy is often used to confirm the diagnosis and rule out other causes.

Both diseases have carrier states.

"The good news is in the acute cases, most of them self-resolve and don't need specific treatment. In the chronic case of hepacivirus or in acute Theiler's disease, you're managing the symptoms and the encephalopathy," she said. **MeV**

Ask the Financial Expert

This column is brought to you by AAEP Educational Partner Synchrony, provider of the CareCredit financing solution.

My clients already have credit cards. Why should I bother with a financing solution?

BY BOO LARSEN

It's a logical question. In fact, it's one we at CareCredit get from healthcare providers of all kinds. "Why do I need to offer another payment option if I already accept general-purpose credit cards?" The answer can be summed up simply: Budget-friendly payment options help clients access the care their horses need in a timely way. Let's take a closer look.

CONSUMERS WANT FLEXIBILITY

At CareCredit, we've been studying financing and payment trends for decades, and we know what consumers want:

- **Payment options.** More than half (59%) of veterinary clients say it's important that their pet care provider offer a variety of payment options.[1]
- **Immediate care.** 78% of veterinary consumers said they would consider a financing option if it meant they could receive medical treatment right away.[1]

What this boils down to is flexibility. Like other consumers, horse owners want the ability to choose from

a range of payment options in a way that fits their budget. And providing them with that flexibility helps support a good financial experience when they seek care through your practice.

PAYMENT OPTIONS CREATE HEALTHY FINANCIAL RELATIONSHIPS

Empowering horse owners with payment options leads to a partnership that places the health and well-being of the horse at the center. In fact, taking a proactive approach—such as communicating payment options as a regular part of your client communications. This proactive approach can help prevent surprises, reduce stress and encourage more clients to be financially prepared. It can also help build stronger relationships built on financial transparency and trust.

FINANCING CAN HELP YOU PROVIDE OPTIMUM PATIENT CARE

A common misperception is that financing is just for emergencies or major expenses. The reality is that it can be—and is—used for routine care, medications, supplements, dentistry and much more. In fact, a recent study of CareCredit customers showed the following:[1]

- 85% use financing for all types of veterinary care, from routine to unexpected.
- 88% say veterinary care financing is a tool that helps with unplanned healthcare expenses, so they'll always be prepared.

In short, empowering horse owners with a flexible, budget-friendly way to pay for veterinary care helps provide them with peace of mind. That means, together, you can both focus on what's most important: the health of the horses in your care. And isn't that what's at the heart of it all?

To discover more about how veterinary financing can help you, your patients, your clients and your practice, visit CareCredit's Equine Insights page.

Boo Larsen is vice president and general manager of the veterinary profession for CareCredit, a Synchrony solution.

[1]CareCredit Path to Care: Pet Care Findings, conducted by Chadwick Martin Bailey on behalf of CareCredit October 2021.

Disclaimer from sponsor: This content is subject to change without notice and is offered for informational use only. Synchrony and its affiliates, including CareCredit, make no representations or warranties regarding the content. You are urged to consult with your individual advisors with respect to any information presented.

A Horse of a Different Color

Novel Mutation Found IN STANDARDBRED HORSE

By Lizy Gershony

The field of genetics has enabled people to predict susceptibility to heritable diseases and map the genome of many species. Now, modern genetics and the birth of a unique foal in New Zealand has provided a successful example of tracking a mutation at its origin.

Researchers at the Veterinary Genetics Laboratory (VGL) at the University of California Davis School of Veterinary Medicine determined that a white pattern in a Standardbred foal is a de novo, or novel, mutation, meaning that it was not inherited by its sire or dam but instead occurred during the development of the foal.

Should the foal eventually be bred, then this coat color can be selected for in subsequent generations, according to the researchers.

The Standardbred filly, not yet officially named, was born at Wai Eyre Farm in Canterbury, New Zealand, with a sabino-like white spotting pattern. She was tested for parentage through Harness Racing New Zealand by InfogeneNZ at Massey University. InfogeneNZ then recommended coat color testing

Photo credit: Wai Eyre Farm, New Zealand

Filly displaying a sabino-like white spotting pattern caused by a de novo mutation.

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.

at the UC Davis VGL to determine the cause of the white pattern.

The breed's most common coat color is bay, but Standardbreds can also be born with black, chestnut or gray coats.

VGL, which conducts scientific research and also provides commercial genetic analysis services, has unique expertise and technology to determine the novel origin of the filly's coat. The laboratory partnered with InfogeneNZ to confirm parentage, using the International Society for Animal Genetics primary and backup panels.

VGL then conducted genetic analysis using allele-specific polymerase chain reaction with products resolved on the Applied Biosystems 3730XL DNA Analyzer (Thermo Fisher Scientific), a custom-designed MassARRAY genotyping assay (Agena Bioscience), and Ion Torrent S5 amplicon sequencing (Thermo Fisher Scientific) to investigate known mutations. Ultimately, the Ion Torrent S5 amplicon sequencing experiment is what allowed for the discovery of the novel variant.

Standardbred filly with dam.

This is the third de novo white coat color variant identified in Standardbreds. VGL intends to track the generational lineage of the filly's novel coat color, should she be bred.

"Discovering a de novo mutation is always exciting as most of the time as geneticists we are trying to trace the history of genetic variation, not identifying the variation in the generation in which they occur," said **Rebecca Bellone,** PhD, the director of the laboratory. "This discovery shows how breeding remains relevant today for helping us to understand the way that mutations occur and their effects on the living world." **MeV**

For more information:

Esdaile E, Till B, Kallenberg A, et al. A de novo missense mutation in KIT is responsible for dominant white spotting phenotype in a Standardbred horse. *Anim Genet*. 2022 May 31. http://doi.org/10.1111/age.13222

https://onlinelibrary.wiley.com/doi/10.1111/age.13222

The only **dual ingredient** injectable corticosteroid approved by the FDA for use in horses

The link between **RAPID ONSET** and **LONG-ACTING RELIEF** of pain & inflammation[1]

BetaVet® (betamethasone sodium phosphate and betamethasone acetate injectable suspension) is indicated for the control of pain and inflammation associated with osteoarthritis in horses.
Learn more at www.betavetequine.com or call 1-800-458-0163.

Please see Brief Summary of Full Prescribing Information on the following page.

INDICATION BetaVet® (betamethasone sodium phosphate and betamethasone acetate injectable suspension) is indicated for the control of pain and inflammation associated with osteoarthritis in horses. **IMPORTANT SAFETY INFORMATION** For **Intra-articular** (I.A.) use in Horses. **CONTRAINDICATIONS** BetaVet® is contraindicated in horses with hypersensitivity to betamethasone. Intra-articular injection of corticosteroids for local effect is contraindicated in the presence of septic arthritis. **WARNINGS:** Do not use in horses intended for human consumption. Clinical and experimental data have demonstrated that corticosteroids administered orally or parenterally to animals may induce the first stage of parturition when administered during the last trimester of pregnancy and may precipitate premature parturition followed by dystocia, fetal death, retained placenta, and metritis. Additionally, corticosteroids administered to dogs, rabbits and rodents during pregnancy have resulted in congenital anomalies. Before use of corticosteroids in pregnant animals, the possible benefits should be weighed against potential hazards. **Human Warnings:** Not for use in humans. Keep this and all medications out of the reach of children. **PRECAUTIONS:** Corticosteroids, including BetaVet,® administered intra-articularly are systemically absorbed. Do not use in horses with acute infections. Acute moderate to severe exacerbation of pain, further loss of joint motion, fever, or malaise within several days following intra-articular injection may indicate a septic process. Because of the anti-inflammatory action of corticosteroids, signs of infection in the treated joint may be masked. Due to the potential for exacerbation of clinical signs of laminitis, glucocorticoids should be used with caution in horses with a history of laminitis, or horses otherwise at a higher risk for laminitis. Use with caution in horses with chronic nephritis, equine pituitary pars intermedia dysfunction (PPID), and congestive heart failure. Concurrent use of other anti-inflammatory drugs, should be approached with caution. Consider appropriate wash out times prior to administering additional NSAIDs or corticosteroids. **ADVERSE REACTIONS:** Adverse reactions reported during a field study of 239 horses of various breeds which had been administered either BetaVet® (n=119) or a saline control (n=120) at five percent (5%) and above were: acute joint effusion and/or local injection site swelling (within 2 days of injection), 15% BetaVet® and 13% saline control; increased lameness (within the first 5 days), 6.7% BetaVet® and 8.3% saline control; loose stool, 5.9% BetaVet® and 8.3% saline control; increased heat in joint, 2.5% BetaVet® and 5% saline control; and depression, 5.9% BetaVet® and 1.6% saline control. **SHAKE WELL IMMEDIATELY BEFORE USE.** For additional safety information, please see full prescribing information. **CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.**

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

BetaVet®
betamethasone sodium phosphate and betamethasone acetate injectable suspension

All trademarks are the property of American Regent, Inc.
© 2021 American Regent, Inc. PP-BV-US-0035 (v2.0) 09/2021

BetaVet®

betamethasone sodium phosphate &
betamethasone acetate

INJECTABLE SUSPENSION

BRIEF SUMMARY OF PRESCRIBING INFORMATION
(Betamethasone Sodium Phosphate and Betamethasone Acetate Injectable Suspension) 6 mg betamethasone per mL
For Intra-Articular (I.A.) Use in Horses

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

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

DOSAGE AND ADMINISTRATION: Shake well immediately before use.

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

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

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

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

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

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

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

SHAKE WELL BEFORE USING
NADA 141-418, Approved by FDA

For customer care or to obtain product information visit www.betavetequine.com or call 1-800-458-0163.

To report an adverse event please contact American Regent Animal Health at 1-888-354-4857 or email pv@americanregent.com.

AMERICAN REGENT® ANIMAL HEALTH

A Division of American Regent, Inc.
5 Ramsey Rd. | Shirley, NY 11967

Some Changes Seen in Antimicrobial Use Among Practitioners, but More Needed to Fight AMR

By Marie Rosenthal, MS

More veterinary clinics are following human hospitals by taking steps to reduce antimicrobial use and include antibiotic stewardship in their practices—at least in the United Kingdom, according to a new study.

However, researchers said many equine veterinarians are still using antibiotics that should be reserved for human use.

Antimicrobial resistance (AMR) is a serious threat to human and animal health both here and abroad.

In the United States, more than 2.8 million AMR infections occur each year among human patients, resulting in the deaths of more than 35,000 people, according to CDC's 2019 Antibiotic Resistance (AR) Threats Report.

Resistance is a One Health issue, the CDC said, requiring veterinarians and physicians working together to lower inappropriate use or overuse. For example, one instance in 2016 resulted in an outbreak of multidrug-resistant *Salmonella* was linked to the farming practices of dairy calves.

Determining what influences veterinarians' prescribing practices is critical to addressing resistance in veterinary practice, according to the CDC.

That was the objective of a survey of equine practitioners in the United Kingdom, where a national 5-year action plan to fight resistance was instituted in 2019.

Various British veterinary associations, including the British Equine Veterinary Association, embraced the plan and produced practice policies, guidelines and other tools to encourage and support responsible antimicrobial use among veterinarians.

The World Health Organization (WHO) prioritizes critically important antibiotics for human use, which include quinolones, third-generation and higher cephalosporins and macrolides.

Researchers from the Department of Equine Clinical Sciences, Institute of Veterinary and Ecological Sciences, at the University of Liverpool, in Neston, conducted an online questionnaire to characterise equine veterinary prescribing practices.

The online questionnaire described 4 clinical scenarios that are commonly seen by equine veterinarians, as well as questions about country of origin, practice policies and prescribing habits, was sent to equine veterinarians in the United Kingdom and Europe.

Two hundred thirty-three U.K veterinarians and 33 European veterinarians completed the questionnaires. Of the recipients, most (87%) worked only with horses and 67% worked at veterinary hospitals.

They found a little more than half (54.4%) had a written antimicrobial use or stewardship policy.

In addition:

- 54.2% did not perform any environmental surveillance,
- 53.1% did not audit clinical infections,
- 57.1% did not audit infection control and,
- >40% encountered a multidrug resistant organism in the last 12 months.

As for actual antimicrobial use:

- 58% always/frequently prescribed prophylactic antimicrobials before clean surgery and
- 24% always/frequently prescribed antimicrobials after surgery.

The most frequently prescribed antimicrobials in the past year were sulfonamides, but 66% prescribed third- or fourth- generation cephalosporins, and 44% prescribed enrofloxacin.

Around 60% of practitioners always/frequently requested a follow-up visit after a course of antibiotics to see how the animal did.

Although the survey showed the continued prescription of high-priority antibiotics used in human medicine, the survey also demonstrated that there was an "increased awareness and use of AM [antimicrobial] stewardship policies compared with previous studies," the researchers wrote. **MeV**

For more information:

Wilson A, Mair T, Williams N, et al. Antimicrobial prescribing and antimicrobial resistance surveillance in equine practice. *Equine Vet J*. 2022 May 16. https://doi.org/10.1111/evj.13587 **https://beva.onlinelibrary.wiley.com/doi/10.1111/evj.13587**

CDC. 2019 Antimicrobial Resistance (AR) Threats Report. **https://www.cdc.gov/drugresistance/biggest-threats.html**

WHO. Critically Important Antimicrobials for Human Medicine.
https://apps.who.int/iris/bitstream/handle/10665/312266/9789241515528-eng.pdf

Caring for a Foal With Severe, Acute Neonatal Isoerythrolysis

By Jeanine Baker

Last May, an approximately 12-hour old chestnut Thoroughbred colt, weighing 63 kg, presented with his dam to Rhinebeck Equine for suspected rib fractures and subsequent hemorrhaging. The foal was born to a multiparous mare, by a prominent leading sire. This was the second live foal out of the mare by this sire. Foaling was attended, and the foal reportedly had a normal birth and stood and nursed well.

Within a few hours, the foal was noted to become dull and less responsive. He was seen on the farm by the referring veterinarian, who noted white mucous membranes and suspected the foal was developing a hemothorax secondary to rib fractures. He was referred to Rhinebeck Equine to be seen by **Laura Javsicas,** DVM, the internal medicine specialist. The referring veterinarian said that the foal was extremely compromised and warned the neonatal team that he may be dead on arrival.

Upon presentation, the foal was alive but recumbent and obtunded. His mucous membranes were pale and tacky, and his eyes were sunken. He was bradypneic at 8 breaths/min (reference range for a neonatal foal 30-60 breaths/min), tachycardic at 140 beats/min (reference range 60-120 beats/min) and hypothermic at 96.0˚F (reference range 99.5˚F-102.0˚). Additional abnormal physical exam findings included decreased borborygmi, and contracted forelimbs and a right hind limb. No rib fractures were palpable, and the umbilical stump was appropriate for a neonate of this age. Icterus was not noted on the mucous membranes or the conjunctiva.

Diagnostic Workup

The foal was set on a mattress in left lateral recumbency, blood was drawn for blood chemistries, intranasal oxygen therapy was initiated at 6 L/min and a brief ultrasonography of the thorax, abdomen and umbilicus was started. A second team started prepping the dam for a blood collection, based off the presumptive diagnosis of hemorrhaging secondary to fractured ribs.

The bloodwork revealed severe anemia and many other abnormalities. The packed cell volume (PCV) was 13% (reference range 27%-43%) and total protein was 5.6 g/dL (reference range 4.6-6.9 g/dL). The lactate was elevated at 21.2 mmol/L (reference range 0.5-1.78 mmol/L). The foal was hypoglycemic at 28 mg/dL (reference range 109-268 mg/dL), azotemic with a creatinine of 4.9 mg/dL (reference range 0.9-1.7 mg/dL), hyperbilirubinemic with a total bilirubin of 5.2 mg/dL (reference range 0.0-4.1 mg/dL) and had an elevated creatine kinase of 1716 U/L (reference range 21-473 U/L). A quantitative immunoglobulin G (IgG) showed adequate transfer of passive immunity at 845 mg/dL.

Ultrasonography did not reveal rib fractures, or any free fluid within the thoracic or abdominal cavity. The umbilicus also appeared normal on ultrasound.

After completing the ultrasound and reviewing the bloodwork (specifically the IgG, PCV, total protein, and total bilirubin) and considering the history of a multiparous mare with multiple foals from the same stallion, neonatal isoerythrolysis (NI) became a stronger differential diagnosis than blood loss as an explanation for the foals clinical signs. rather than blood loss.

NI is an uncommon but well-documented disease that affects foals of multiparous mares. The disease is caused by the foal ingesting and absorbing antibodies in the dam's colostrum that are incompatible with the foal's red blood cells (RBC), due to antigens that the foal acquired from the sire. The ingested antibodies bind to the foal's RBCs, causing hemolysis and hemolytic anemia. NI typically manifests within the first 5 days of life, and the severity of symptoms is thought to be dose dependent. While foals can often overcome the disease with minimal supportive care, more severe cases require blood transfusions, fluid therapy, corticosteroids, antimicrobials, supplemental oxygen and intensive nursing care to overcome the primary disease and to prevent secondary disease processes from occurring. This case report describes the care of a foal that presented to Rhinebeck Equine with severe, acute onset of NI.

The blood that was collected from the mare was discarded, and an ambulatory team was dispatched to collect blood from a local universal donor horse. A 16-gauge over-the-wire catheter was aseptically placed in the right jugular vein, and a sterile blood culture was taken. The foal was administered ceftiofur sodium IV every 12 hours, aminocaproic acid, methylprednisolone sodium succinate and crystalloid fluids.

The colt began receiving his blood transfusion within 90 minutes of arriving at the hospital and tolerated

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.

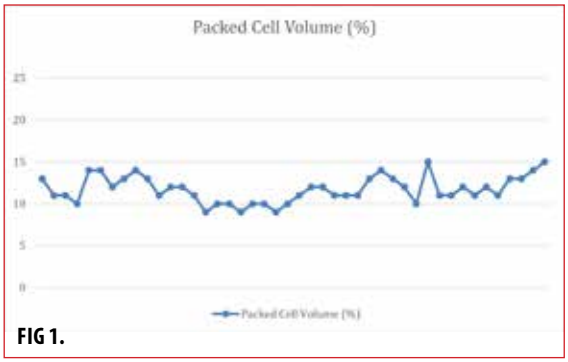


FIG 1. Packed cell volume trends

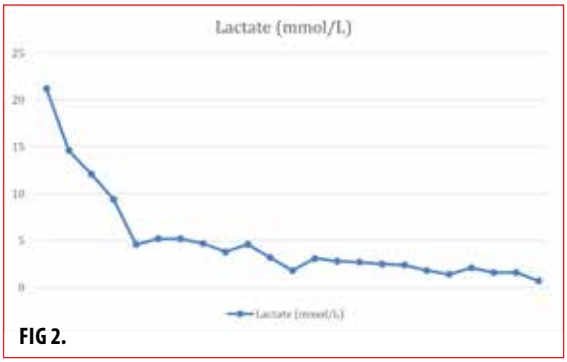


FIG 2. Lactate trends

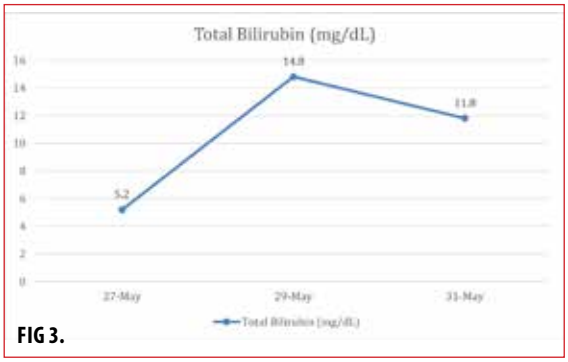


FIG 3. Total bilirubin trends

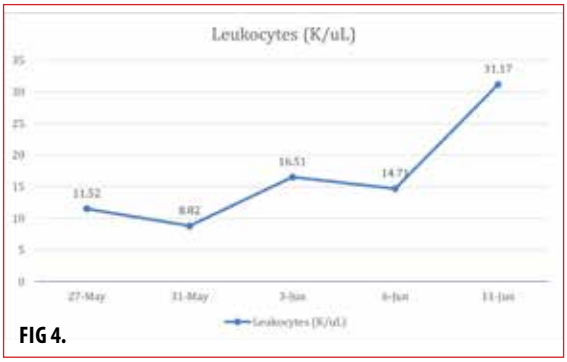


FIG 4. Leukocyte trends

it well, receiving 1.5 L of blood in total over the course of 2 hours. His temperature increased, although he was still hypothermic, his respiratory rate increased to 28 breaths per minute, and his heart rate stabilized to 116 beats per minute. He became brighter and more interactive and responsive to stimuli, although he remained recumbent. His blood glucose increased to 229 mg/dL before stabilizing at 170 mg/dL.

About 4 hours after starting his blood transfusion, he was able to stand briefly with assistance. Some physical exam parameters began to normalize, such as his mentation, temperature (normothermic at 100.5) and respiratory rate (eupnic at 32 breaths per minute). His mucous membranes remained pale pink and tacky with an instantaneous capillary refill time, and borborygmi remained decreased. A nasogastric feeding tube was placed, and he began receiving supplemental milk at 5% of body weight per day q2 from the hospital's banked supply. The dam was milked out routinely and the milk was discarded. The dam's serum and the foal's pre-transfusion whole blood samples were sent to a referral laboratory for a mare-foal compatibility test to screen for NI. A pre-transfusion serum sample was not obtained from the foal for a major crossmatch, so only a minor crossmatch was performed.

Although the foal was improving from admission, he remained dull. His PCV dropped to 10% and the decision was made to administer another 1L of donor blood later that evening, bringing the total amount of transfused blood to 2.5L. The foal was continued on supplemental oxygen and methylprednisolone sodium succinate. Crystalloid fluids were discontinued after roughly 12 hours. Serial lactate and PCV were obtained, which showed an improvement in the lactate–decreasing to 9.4 mmol/L in 12 hours–and the PCV rising briefly to 14% (Figure 1, 2).

After 36 hours in the hospital–about 48 hours of age–the foal was allowed to nurse from the mare q2h. A jaundice foal agglutination (JFA) test was not performed to confirm the milk was safe for the foal to ingest, instead relying on the knowledge that a foal can no longer absorb antibodies from colostrum after 36-48 hours of foaling. The foal was brighter but still required supplemental oxygen to combat hypoxia. Oxygen challenges, such as disconnecting the foal from oxygen when allowed to nurse, resulted in increased respiratory rate and effort. During the next 24 hours, the foal would nurse for increased time, and eventually could tolerate the oxygen rate being decreased to 4 L/hr. Serial readings obtained from a pulse oximeter showed that his oxygenation remained stable in the low 90s.

PRESTIGE®

The True Colors of **Vaccine Performance**

- **Flexibility by Design**
  Multiple antigen combinations make creating custom programs easy

- **Proven Safety and Efficacy**
  Shown to be 98% reaction-free in field safety trials[1]

- **People and Programs That Make a Difference**
  Merck Animal Health industry support and dedication to equine welfare included in every dose

Trust PRESTIGE® vaccines —the spectrum of essential disease protection.

Talk to your Merck Animal Health representative today to learn more about the PRESTIGE® line of vaccines or visit **PrestigeVaccines.com**

[1] Data on file. Merck Animal Health.

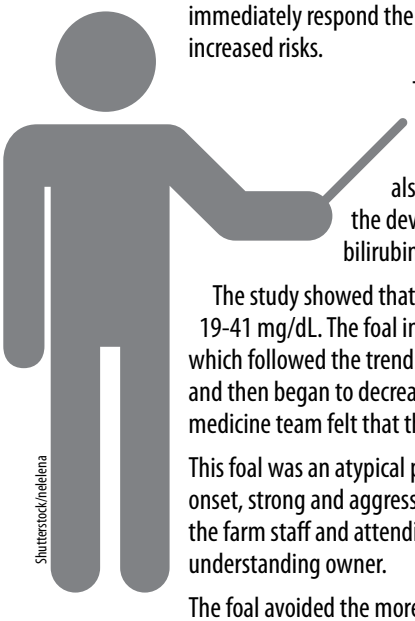
2 Giralda Farms • Madison, NJ 07940 • merck-animal-health-usa.com • 800-521-5767

Copyright © 2022 Merck & Co., Inc., Rahway, NJ, USA and its affiliates. All rights reserved.

MERCK Animal Health

Teaching Points

The foal's treatment for neonatal isoerythrolysis had to be planned and executed carefully. He had a great need for additional blood products, but whole blood transfusions come with the risk of liver failure. A retrospective study published in 2008 found that the incidence of liver failure increases with each liter of whole blood transfused. Amounts more than 2 or 3 liters provide enough iron to create iron toxicity, which in turn can lead to liver failure. Treatment with deferoxamine, an iron chelator shown to be effective in foals, was considered in this case but could not be obtained. The foal in question received a total of 3 transfusions equaling a total of 3 L. After the third transfusion, although his packed cell volume did not immediately respond the way the medicine team had hoped, it was decided against more transfusions due to these known increased risks.



Shutterstock/nelelena

The foal's liver enzymes, specifically the total bilirubin, were watched carefully throughout his hospitalization. Although a liver panel was not sent to a referral laboratory to determine the amounts of conjugated versus unconjugated bilirubin, the previously referenced study also showed that there is a direct correlation between the maximum serum total bilirubin and the development of kernicterus, or bilirubin encephalopathy, which is a disease where unconjugated bilirubin enters the neurons in the brain and causes neurological symptoms, such as seizures.

The study showed that kernicterus developed in foals that had maximum total bilirubin levels ranging from 19-41 mg/dL. The foal in this case report had multiple full chemistry panels run on the in-house chemistry analyzer, which followed the trend of the total bilirubin levels as they increased to a maximum of 14.8 mg/dL 2 days after admission and then began to decrease. While kernicterus was always a possibility because of the severity of the foal's disease, the medicine team felt that the need for additional red blood cells outweighed the risk of kernicterus.

This foal was an atypical presentation of neonatal isoerythrolysis in that the response to the dam's antibodies was rapid in onset, strong and aggressive. The foal was given the best chance for a favorable outcome due to the quick observations of the farm staff and attending veterinarian, prompt referral, a competent nursing team that provided excellent care, and an understanding owner.

The foal avoided the more serious implications of NI, such as kernicterus, but did develop multiple comorbidities even in the face of excellent and timely care and treatment, demonstrating how serious NI can be.

A full chemistry panel was repeated 2 days after admission. The azotemia had improved with a creatinine of 1.4 mg/dL, but the hyperbilirubinemia increased to 14.8 mg/dL (Figure 3) and the AST was 506 U/L (reference range 0-228 U/L). The in-house chemistry analyzer was unable to get a reading of AST on intake, and no dilutions were performed at that time, so the initial result is unknown. The CK, which was elevated at presentation, was unable to be read on the repeat chemistry. No dilutions were performed.

Seventy-two hours after initial presentation, the PCV decreased to 9% and it was decided to administer another 500 mL of donor blood, bringing the total amount of transfused blood to 3 L. A repeat chemistry the following day revealed improvements in the AST (403 U/L) and total bilirubin (11.8 mg/dL). The CK had decreased and was within the normal reference range at 395 U/L, and the creatinine remained within normal limits at 1.4 mg/dL. The foal was switched from methylprednisolone to dexamethasone because the PCV and anemia was still not responding favorably to the whole blood transfusions.

On day 5 of hospitalization, the foal was discontinued from oxygen. The next day, a very slight, subcutaneous swelling at the IV catheter insertion site prompted removal of the catheter and upon removal, a moderate amount of purulent material drained from the insertion site. A culture was taken and submitted for an in-house culture and sensitivity. The foal remained on the current antibiotic and steroid regimen, although everything was now administered intramuscularly.

Twenty-four hours after removing the IV catheter, the colt became febrile (103.1˚F) for the first time since being hospitalized, and his conjunctiva appeared more icteric than they had previously. A repeat CBC showed, along with his documented chronic anemia, a leukocytosis of 16.51 K/µL (reference range 4.90 - 11.10 K/µL), marked by neutrophilia of 13.10 K/µL (reference range 2.50 - 6.90 K/µL) (Figure 4). An ultrasound of the right jugular vein was consistent with septic thrombophlebitis

FIG 5. Ultrasonography showing thrombosis of the right jugular vein

FIG 6. Ultrasonography showing thickened internal umbilical structures, indicating omphalophlebitis as a secondary disease process. This is depicting measurements of the right umbilical artery.

FIG 7. Ultrasonography showing pleural roughening of the lungs, indicating pneumonia as a secondary disease process.

(Figure 5). Since he was also noted to have developed a patent urachus overnight, an ultrasound of the internal umbilical structures was performed, which revealed omphalophlebitis (Figure 6). He was started on rifampin suspension (5mg/kg PO q12h) and clopidogrel (loading dose of 4mg/kg PO once, then 2 mg/kg PO q24h), along with the Naxcel and dexamethasone. He was also administered a 125# dose of flunixin meglumine paste for the pyrexia. The culture and sensitivity results from the IV catheter site revealed growth of *Staphylococcus aureus,* and the blood culture revealed no growth. Based on these results, he was switched to chloramphenicol (50 mg/kg PO q6h).

Repeat bloodwork on day 10 of hospitalization revealed improving leukocytosis and neutrophilia, at 14.71 K/µL and 10.59 K/µL, respectively. Inflammatory markers were elevated, with fibrinogen at 405 mg/dL (reference range 100-400 mg/dL) and the serum amyloid A (SAA) at 10,880 mg/L (reference range 0-20 mg/L). A thoracic ultrasound revealed the foal had developed pneumonia (Figure 7). The antimicrobial treatment plan remained the same.

On day 15, a repeat SAA showed a decrease to 2,160 mg/L. A CBC revealed a significantly increased leukocytosis and neutrophilia, at 31.17 K/µL and 28.03 K/µL, respectively.

The foal was clinically improving. Although inflammatory markers were still elevated, they were decreasing from previous levels. Despite the increased leukocytosis and due to financial prudence, it was determined that the foal could be transferred back to the farm and his care could be taken over by the farm staff, with repeat bloodwork being performed by the referring veterinarian. The foal was discharged from the hospital 15 days after being admitted. After-care instructions included stall rest, continued antimicrobial therapy, umbilical care, and jugular vein care, including remaining on clopidogrel. His PCV was 15% at the time of discharge.

Two weeks later, the foal was admitted to the hospital with a presenting complaint of lameness and effusion of not in right stifle and left hock. Repeat bloodwork was performed and revealed a PCV of 28%, along with leukocytosis and neutrophilia. An arthrocentesis was performed, and it was determined that the foal had septic arthritis. After a brief stay in the hospital for antimicrobial treatment and joint lavages, the foal was discharged to the farm. **MeV**

About the Author

Janine has a B.T. in Equine Science from SUNY Morrisville and a Veterinary Technician A.S. from Penn Foster College. Janine has worked at Rhinebeck Equine since 2015 as a member of the internal medicine team. She has developed a passion for internal medicine and is contemplating the idea of pursuing a VTS in LAIM. Janine lives in New York's Hudson Valley region, where she enjoys hiking with her English Pointer "Ace".

For more information:

Robinson, N. Current Therapy in Equine Medicine. 5th ed. Philadelphia: Saunders; 2003:636.

Polkes A, Giguère S, Lester G et al. Factors associated with outcome in foals with neonatal isoerythrolysis (72 Cases, 1988-2003). *J Vet Intern Med*. 2008;22:1216-1222.

Elfenbein J, Giguère S, Meyer S et al. The effects of deferoxamine mesylate on iron elimination after blood transfusion in neonatal foals. *J Vet Intern Med.* 2010;24:1475-1482.

Some Sight for Sore Eyes

By Melanie Greaver Cordova

Jacqueline Rapp, VMD, PhD, of Susquehanna Valley Veterinary in New York was called to check out 3-year-old Quarter horse, Willy. His owners reported that his eye would cloud over one day and be clear the next. He was bumping into things, often cutting his face, and he was also easily spooked.

Courtesy of Cornell University College of Veterinary Medicine

Willy's left eye.

Courtesy of owner.

Willy at home.

Dr. Rapp referred him to the ophthalmologists at Cornell University College of Veterinary Medicine, which diagnosed diagnosed equine recurrent equine recurrent uveitis (ERU), a common but harmful complex autoimmune disease among horses, with both genetic and environmental factors.

Between 2% and 25% of horses are estimated to have ERU, and most eventually go blind. Sometimes, the eye is removed. The disease is most common among Appaloosas and Warmblood breeds, although it can affect any horse breed as well as mules and donkeys.

Signs include eye pain, swollen eyelids, excessive tearing or a cloudy appearance to one or both eyes. In some cases, uveitis may not lead to obvious outward clinical signs until the disease is more advanced.

"This disease is particularly devastating, as many horses do not show outward signs of a problem, so it can go unrecognized for long periods and loss of vision may be the first thing that is noticed," said **Kelly Knickelbein,** VMD, an ophthalmologist and assistant clinical professor at Cornell, whose team cared for Willy.

The ophthalmologists looked for signs of haziness of the ocular fluids, as well as changes to the iris, lens and retina.

They found that Willy was able to see from his right eye but only had light perception in the left. He had severe inflammation in both eyes, in addition to changes to his irises, lenses and retinas. They tested his ocular fluid and blood to look for evidence of infectious agents associated with ERU, and treated him with topical steroids and atropine. He also received intraocular injections of an antibiotic thought to break the cycle of recurrent or persistent intraocular inflammation.

Fortunately, Willy responded well to his treatment plan.

"At his most recent recheck evaluation, he had no active inflammation inside either eye and seemed to be very comfortable. In addition, we were very happy that he regained functional vision in his left eye," Dr. Knickelbein said.

Many horses with visual impairment or even complete blindness can have an excellent quality of life, and some may be suitable for continued use as riding horses depending on their discipline, level of training, the level of training of the rider and the duration of the partnership. The safety of both human and horse should be foremost during any handling or ridden activity involving visually impaired horses, so visually impaired or blind horses only be handled and ridden by adults fully informed about the impairment, and who are willing to accept the risks.

Thus far, Willy has made the journey up to Cornell four times. "He has a wonderful experience each time, and he always loves rolling in Cornell's fresh bedding after his check-ups," Dr. Kauffman said.

Although Willy is still visually impaired, Dr. Kauffman reports he's doing well and is back to his silly self. "He is such a loving and goofy horse. He can chase the chickens and loves to throw around his ball in the pasture," Dr. Kauffman said. "Although he's had his ups and downs, he is such a remarkable horse."

The ophthalmologists at Cornell are hopeful that Willy will retain his sight and that his eyes stay comfortable long-term, but future episodes of uveitis may happen. They plan to recheck his eyes every few months, and in the meantime, he receives a topical medication to limit inflammation and the owners are diligent about monitoring for changes.

Monitoring is key to helping Willy maintain vision and be comfortable, Dr. Knickelbein said.

"Willy was a champ through it all. We couldn't be any happier with all the care he has received," Dr. Kauffman said. "If it wasn't for Cornell, he would most likely be blind in both eyes by now." **MeV**

Originally published on the Cornell University site at **https://www.vet.cornell.edu/news/20220606/equine-eye-docs-help-horse-regain-sight**

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.

Are You a Horse Whisperer?

How we speak matters to animals.

Horses and pigs, both domestic and wild, can distinguish between negative and positive sounds from their fellow species and near relatives, as well as from human speech, according to new research in behavioral biology. And just like people, they tend to react to positivity more than negativity.

The study provides insight into the history of emotional development and provides interesting perspectives regarding animal welfare, according to the researchers.

In an international collaboration, behavioral biologist **Elodie Briefer,** PhD, BSc, MSc, of the University of Copenhagen's Department of Biology, investigated whether a range of animals can distinguish between positively and negatively charged sounds.

"The results showed that domesticated pigs and horses, as well as Asian wild horses, can tell the difference, both when the sounds come from their own species and near relatives, as well as from human voices," Dr. Briefer explained.

Pigs were studied along with wild boar. Just as in the case of the two related horse species, the pigs clearly reacted to how the sounds of their counterparts were emotionally charged. In fact, they reacted to the same to the same extent as when it came to sounds of their own kind.

The animals even showed the ability to distinguish between positively or negatively charged human voices. While their reactions were more subdued, all but wild boars reacted differently when exposed to human speech that was either charged with positive or negative emotion.

Human Gibberish

The researchers played recordings of animal sounds and human voices from hidden speakers to animals that were either privately owned (horses), from a research facility (pigs) or living in zoos in Switzerland and France (wild Przewalski's horses and wild boars).

The speakers provided a high sound quality to ensure for the natural frequencies heard best by animals. The sounds were played in sequences with either a positive or negatively charged sound first, then a pause—and then sounds with the opposite emotion.

The reactions were recorded on video, which the researchers could subsequently use to observe and record the animals' reactions.

The animals' behavioral reactions were recorded in several categories used in previous studies—everything from their ear position to their movement or lack thereof.

On this basis, the researchers concluded that the way we speak matters to animals.

"Our results show that these animals are affected by the emotions we charge our voices with when we speak to or are around them. They react more strongly—generally faster—when they are met with a negatively charged voice, compared with having a positively charged voice played to them first. In certain situations, they even seem to mirror the emotion to which they are exposed," Dr. Briefer said.

Part of the aim of the study was to investigate the possibility of "emotional contagion" in animals—a kind of mirroring of emotion. "Should future research projects clearly demonstrate that these animals mirror emotions, as this study suggests, it will be very interesting in relation to the history of the development of emotions and the extent to which animals have an emotional life and level of consciousness," Dr. Briefer said.

The study was unable to detect clear observations of emotional contagion, but the order by which the sounds where delivered provided an interesting result. Sequences in which the negative sound was played first triggered stronger negative reactions in all but the wild boars. This included human speech.

According to Dr. Briefer, this suggests that the way we talk around and to animals may have an impact on their well-being.

"It means that our voices have a direct impact on the emotional state of animals, which is very interesting from an animal welfare perspective," she said.

This knowledge does not just raise ethical questions about how we perceive animals—and vice versa, it can also be used as a concrete means of improving animals' daily lives if those who work with them are familiar with it.

"When the animals reacted strongly to hearing negatively charged speech first, the same is also true in the reverse. That is, if animals are initially spoken to in a more positive, friendly voice, when met by people, they should react less. They may become calmer and more relaxed," Dr. Briefer said.

Next, the researchers looking into how well people can understand animal sounds of emotion.

The researchers thought that horses reacted the way they did because animals with a common ancestry may be able to perceive and interpret each other's sounds by virtue of their common biology. **MeV**

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.

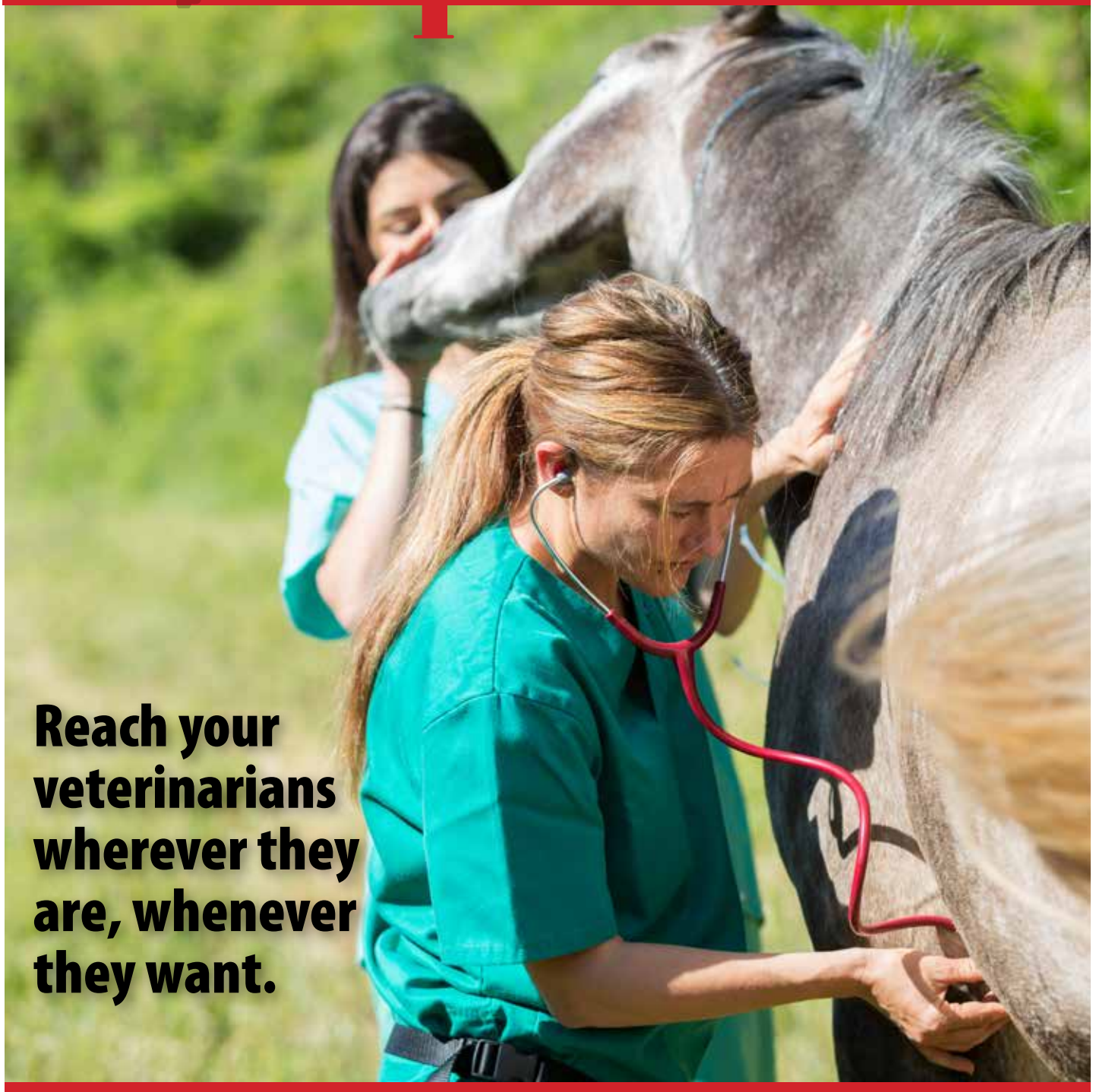
References:
[1] Brendemuehl JP, Kopp K, Altman J. Uterine Inflammatory Response to Frozen Semen is attenuated by Oral Supplementation of a Blend of Omega-3 Fatty Acids (Algal DHA and Flax Seed) in Susceptible and Resistant Mares. Submitted to Theriogenology. [2] Brendemuehl JP, Altman J, Kopp K. Influence 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