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ASK THE Infectious Disease Expert

These columns, brought to you by Merck Animal Health, feature insightful answers from leading minds.

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SPECIAL SUPPLEMENT SUPPORTED BY MERCK ANIMAL HEALTH

ASK THE Infectious Disease Expert

IN THESE FOUR ARTICLES, leading infectious disease experts discuss the latest research and threats related to equine disease, underscoring the significant risks these infections pose to the patient, other horses, and in some cases, the people who care for them.

That is why Merck Animal Health has been sponsoring the Ask The Infectious Disease Expert column in *Modern Equine Vet*: to help busy veterinarians stay abreast of the latest information about equine infectious diseases.

In this digital supplement, you will find 4 of the most recent columns, as well as a link to a video interview with Dr. Philip van Harreveld, who participated in the study discussed by Dr. Kate L. Hepworth-Warren. The recent study found that pelleted diclazuril—used to treat equine protozoal myeloencephalitis—quickly reaches therapeutic levels in cerebrospinal fluid. You can read her article on page 6, and watch the interview by following the link from this page.

ALSO IN THIS SUPPLEMENT:

In addressing the issue of silent shedders, Dr. Cara Wright writes about respiratory pathogens and the role of testing healthy horses at racetracks and horse shows. Her study, which examines how exercise influences the detection of specific respiratory pathogens in healthy horses, can be found on page 3.

One of the preeminent equine infectious disease specialists, Dr. Nicola Pusterla, provides new information about equine herpesvirus-4 (EHV-4). His recent study sheds light on just how aggressive EHV-4 can be. Read more about this study on page 4.

Dr. Sally Denotta discusses a new threat to horses and livestock that could affect the nation's food supply. Veterinarians are on the front line of this growing infectious threat, which was eliminated in the United States in 1966. Find out more on page 5.

Watch the video with Dr. Philip van Harreveld

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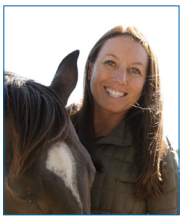

Cara Wright, DVM, MS, IVCA

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Kate Hepworth-Warren, DVM, DACVIM (LAIM)

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Can Exercise Help Detect Silent Shedders of Common Respiratory Pathogens?

CARA WRIGHT, DVM, MS, IVCA

As equine veterinarians, we're all too familiar with the turmoil respiratory disease outbreaks can cause for our horses and equestrian events. Current preventive measures focus on identifying and isolating sick horses, but little attention is given to testing healthy horses at events. Previous studies have highlighted the importance of identifying silently infected horses, especially regarding equine herpesvirus-1 (EHV-1) and *Streptococcus equi* spp *equi (S. equi),* as a potential source of infection. Finding these horses is a challenge. Concurrently, prior work has shown that less invasive sample collection has high agreement with nasal swabs for both EHV-1 and 2.

Our new study1, "Investigation of the role of exercise in the detection of selected respiratory pathogens from nose wipes collected from healthy horses," examined this very issue by testing healthy horses at racetracks and horse show training barns. The study aimed to determine if exercise increases the frequency of selected respiratory viruses/bacteria shedding in non-clinical horses using nose wipes.

Samples were collected from 133 horses across three racetracks in California, Oklahoma and Maryland, as well as three horse show training barns in California during April and May 2024. The study population included diverse breeds and ages, with Thoroughbreds and Quarter Horses engaged in racing activities, and Warmbloods, ponies and Lusitanos participating in shows. Each horse had its nose wiped before and after routine exercise with an individually wrapped sterile saline wipe. Nose wipes were assayed for the presence of selected common (EHV-1, EHV-4, *S. equi*) and commensal (EHV-2, EHV-5, *S. zooepidemicus*) respiratory DNA microbes using previously validated qPCR assays.

WHAT WE FOUND

The study results showed that exercise increased the detection frequency of EHV-1, EHV-2, EHV-5 and S. zooepidemicus in nose wipes collected from non-clinical horses. Further, the results showed that absolute quantitation (total number) of the selected respiratory viruses/bacteria was lower in post-exercise samples.

The frequency of commensal respiratory organisms was quite high in our study population—between 45.9% and 54.9% in pre-exercise nose wipes. Interestingly, racing horses showed higher detection rates of EHV-2, EHV-5, and *S. zooepidemicus* compared to show horses. The high detection rate of EHV-1 in clinically normal racing horses was unexpected, revealing just how common silent EHV-1 shedders are among young horses. Like the commensal viruses/bacteria, EHV-1 was detected more frequently in post-exercise samples. The sporadic detection of EHV-4 and *S. equi* made it difficult to draw meaningful conclusions about exercise's effect on their detection.

WHAT DOES THIS MEAN FOR PRACTITIONERS?

While the absolute quantity of pathogens appeared to decrease post-exercise, our detection frequency improved. This suggests that timing your sample collection after exercise might help you identify more carriers than sampling at rest.

We also confirmed that nose wipes seem to be an effective, less invasive collection method that improves horse compliance during sampling — a practical consideration for busy practitioners at events or investigating potential outbreaks. Next research steps include directly comparing nose wipes with the reference standard of nasal swabs.

These findings represent an important step toward better respiratory disease management in our equine patients.

ABOUT THE AUTHOR

Cara Wright, DVM, MS, IVCA, is a Senior Equine Professional Services Veterinarian for Merck Animal Health. Her background in equine practice spans both ambulatory and hospital-based practices, and she serves on numerous professional organizations dedicated to the sustainability of an equine veterinary career.

For more infectious disease information, visit the Merck Animal Health **Respiratory Biosurveillance Program** page.

1. C.A. Wright, K. Lawton, S. Barnum, B.W. Craig, B.R. Farwell, J. Blea, C. McCook, N. Pusterla. Investigation of the role of exercise in the detection of selected respiratory pathogens from nose wipes collected from healthy horses, *Journal of Equine Veterinary Science*, Volume 146, 2025, 105377, ISSN 0737-0806, **https://doi.org/10.1016/j.jevs.2025.105377**.

What New Information on EHV-4 Should Veterinarians Keep in Mind When Diagnosing and Treating Respiratory Disease?

NICOLA PUSTERLA, DVM, PHD, DACVIM, DAVDC-EQUINE

Equine herpesvirus-4 (EHV-4) has long been recognized as a common cause of respiratory illness in young horses, often resulting in mild clinical signs like fever, nasal discharge and occasional lethargy. However, our newly published study sheds light on how this virus may occasionally behave more aggressively than previously thought. The study abstract can be viewed here.

In a study of 183 horses with acute fever and respiratory signs, 13.7% of those who tested positive for EHV-4 in nasal swabs also had the virus detected in their bloodstream (viremia).1 This is a stark contrast to equine herpesvirus-1 (EHV-1), where viremia is expected in nearly all infected horses. EHV-4 doesn't have the same ability as EHV-1 to invade the bloodstream. This likely accounts for why we don't see EHV-4 causing complications like abortion or myeloencephalopathy.

TABLE 1: **EHV-4 qPCR-POSITIVE HORSES, N=183 (%)**

	Nasal Secretions	Blood
EHV-4	183 (100)	25 (13.7)
EHV-1	3 (1.6)	0 (0)
EIV	20 (10.9)	NA
ERAV	0 (0)	NA
ERBV	16 (8.7)	NA
S. equi	18 (9.8)	NA

EHV-4 viremia was only found in horses already shedding the virus through nasal secretions. None of the control horses (febrile horses with no detectable EHV-1 in nasal secretions) tested positive for EHV-4 in their blood. This indicates that viremia is closely tied to active viral shedding, reinforcing that blood testing may only be relevant in confirmed shedding cases.

YOUNG HORSES ARE MORE LIKELY TO BE VIREMIC

Although rare, the detection of EHV-4 in the blood raises important clinical considerations. Viremia suggests the virus can move beyond the respiratory tract, potentially affecting other organ systems. Notably, younger horses were more likely to be viremic and showed a higher incidence of distal limb edema—a finding that surprised our research team. While the exact cause is speculative, it may be due to interaction of EHV-4 with blood vessels of the distal limbs.

The study also found that over a quarter (27.3%) of EHV-4-positive horses were co-infected with other respiratory pathogens, including equine influenza virus (11%), Streptococcus equi subspecies equi (10%), equine rhinitis B virus (9%), and even EHV-1 (2%). Stress and latent infections likely play a role in these co-infections—and when multiple pathogens are at work, the clinical signs can be more severe.

CLINICAL TAKEAWAYS

This research offers a few practical insights:

1. **Monitor young horses closely:** Younger horses with fever and respiratory signs should be watched carefully for signs beyond the respiratory tract, like limb edema.
2. **Consider blood testing in severe cases:** While routine blood testing for EHV-4 isn't necessary, it could be informative in young horses showing more severe or unusual clinical signs, especially when nasal shedding is confirmed.
3. **Watch for co-infections:** Horses with EHV-4 may also be battling other respiratory pathogens, which could worsen clinical signs.
4. **Biosecurity still matters:** Even though EHV-4 complications are rare, biosecurity measures and vaccination protocols should remain a priority, especially in facilities housing young stock.

While EHV-4 viremia is uncommon, understanding its potential impact helps us provide more comprehensive care. Our findings reinforce that EHV-4 typically causes mild disease but, on occasion, it can cross into the bloodstream and contribute to more complex clinical presentations. Being aware of this can improve how we manage and support affected horses. This study offers a timely reminder that even familiar pathogens like EHV-4 can surprise us, underscoring the importance of ongoing research and vigilant clinical observation.

ABOUT THE AUTHOR

Nicola Pusterla, DVM, PhD, DACVIM, DAVDC-Equine is a professor of equine internal medicine and dentistry at the University of California, Davis, School of Veterinary Medicine. His research focuses on equine infectious diseases with an emphasis on molecular epidemiology. Dr. Pusterla also leads the UC Davis Equine Infectious Disease Research Laboratory.

For more infectious disease information, visit the Merck Animal Health Respiratory Biosurveillance Program page.

1. Pusterla N, Barnum S, Lawton K, Craig B, James K. Investigation of the frequency and selected prevalence factors of equid alphaherpesvirus 4 viremia in horses with acute onset of fever and respiratory signs. *Journal of Veterinary Diagnostic Investigation*. 2025;37(2):349-353. doi:10.1177/10406387241308080.

What is the New World Screwworm and What Should We Communicate to Horse Owners?

SALLY DENOTTA, DVM, PHD, DACVIM

The New World screwworm (NWS) is a growing U.S. threat, and equine veterinarians are on the front line. The following is a primer on NWS. We encourage you to take advantage of the resources available through AAEP and USDA noted below to learn more.

NOT IF, BUT WHEN

New World screwworm is caused by NWS fly larvae (*Cochliomyia hominivorax*). This is not your typical "roadkill" maggot but a flesh-eating fly larva that feeds on healthy tissue. Screwworms plagued U.S. livestock until a landmark sterile-insect eradication program eliminated them in 1966. Today they remain endemic to parts of Central and South America and are inching northward. Recent outbreaks only 700 miles from our southern border have experts predicting a U.S. incursion by year's end.

Image courtesy of USDA.

New World screwworm larvae.

The NWS fly lays eggs in an open wound, gaining access through even the tiniest skin break—abrasions, lacerations or even insect bites—and hatch into maggots that burrow (screw) into healthy tissue. The larvae can affect any mammalian host, including people, so any animal is susceptible. A heavy infestation can kill the host; lighter infestations cause severe pain and discomfort, secondary infection and production losses. Fortunately, it is very treatable, but the potential economic impact is concerning. An outbreak would cost livestock producers millions, triggering trade restrictions and costly re-eradication efforts, so authorities are focused on preventing it from re-entering the United States.

In May, U.S. Secretary of Agriculture Brooke Rollins shut down the southern U.S. border to all cattle, horses and bison, and in mid-June unveiled an aggressive **plan** to mitigate U.S. entry of NWS. One component is another sterile-insect program, where male screwworm flies are irradiated and then strategically released into the wild to stop the lifecycle.

SOUTHERN BORDERS ON WATCH

The most likely arrival will be via wildlife that can freely cross the border. As such, livestock owners, horse owners and veterinarians will be on the front lines of recognizing and reporting NWS. Those in our southernmost border states should be the most vigilant, but that doesn't mean NWS can't spread northward on an infected animal in warmer seasons. This particular fly does not overwinter well, so it won't take up permanent residence in cold climates. Visual identification is key.

- Any open wound that is not healing appropriately with a maggot infestation should be investigated. Unlike typical fly larvae (which eat only necrotic tissue), screwworms gorge on living flesh.
- Other clinical signs include extreme discomfort and agitation. The animal may exhibit headshaking, stomp, kick or try to bite the wound. A foul odor may also be present.

If you suspect NWS, collect larvae from the wound for identification and contact your state animal health official immediately.

WHAT SHOULD I TELL HORSE OWNERS?

- **Be vigilant.** Any wound—no matter how small—that harbors maggots warrants an immediate call to the veterinarian. Do not rely solely on fly spray or over-the-counter wound dressing.
- **Understand the risk**. Horses in southern border states are most at risk, but infected animals can be transported north.
- **Act quickly.** Early detection means straightforward treatment and minimal animal suffering. Mortality is rare if managed promptly.

If you or your client suspect NWS, contact your state animal health official immediately. Containment depends on timely reporting. Together, we can prevent the re-establishment of this devastating pest in the United States.

FOR MORE INFORMATION:

USDA APHIS NWS Information
Equine Disease Communication Center
AAEP Webinar: NWS Update

ABOUT THE AUTHOR

Sally DeNotta, DVM, PhD, DACVIM, is board-certified by the American College of Veterinary Internal Medicine and is a member of the clinical faculty at the University of Florida College of Veterinary Medicine. She currently serves as the chair of the AAEP Infectious Disease Committee.

For more equine infectious disease information, visit the Merck Animal Health Equine page.

How Quickly Does Pelleted Diclazuril Reach Therapeutic Levels in Cerebrospinal Fluid, and Why is That Important for the Treatment of EPM?

KATE HEPWORTH-WARREN, DVM, DACVIM (LAIM)

Great question. With a progressive neurological disease like equine protozoal myeloencephalitis (EPM), the faster you begin treatment the better the outcome, especially in acute cases. Final test results can take a few days, or up to a week, so it is crucial to begin empirical treatment before they are available. Diclazuril is a first-line antiprotozoal agent against Sarcocystis neurona, but until now we haven't had definitive data to understand when its concentration in cerebrospinal fluid (CSF) reaches the minimum inhibitory concentration (MIC) for this parasite. In other words, how quickly does it begin working?

A recent pharmacokinetic study conducted by our team at North Carolina State University fills that gap and offers practical guidance for equine practitioners.

The study involved six healthy adult horses that were neurologically normal and negative for EPM. We measured diclazuril levels in both plasma and CSF following a single oral dose administered at the labeled dose of 1 mg/kg top-dressed on sweet feed. Blood and CSF were collected at baseline then 1, 4, 8, 12, 16, 24, 48, 72, 96, 120, 144, 168 and 192 hours post-administration.

KEY STUDY FINDINGS

A standout finding of this research is the speed at which diclazuril reached therapeutic levels in the CSF:

- **MIC achievement:** Diclazuril concentrations in the CSF surpassed the MIC of S. neurona (1 ng/mL) in all horses by 12 hours post-administration.
- **Peak concentrations:** The CSF concentrations peaked at 24 hours, while plasma concentrations peaked later at 48 hours. A horse with active EPM carries the parasite in the nervous system, which is why CSF concentrations are more valuable than blood levels alone.
- **Prolonged therapeutic effect:** Not only did diclazuril reach the MIC quickly, but it also remained well above the MIC through 8 days, suggesting a sustained therapeutic effect.

HOW DO I APPLY THIS TO EPM CASES IN MY PRACTICE?

The proven ability of diclazuril to reach therapeutic levels within 12 hours of one oral dose allows for prompt treatment of horses suspected to have clinical EPM. This can be especially critical in acute cases where time is of the essence. The study provides practitioners with added confidence in prescribing diclazuril as a first-line option for treating EPM.

When delivering an EPM diagnosis, it's common for owners to feel anxious and impatient. Communicate that although clinical improvement may lag behind drug exposure, diclazuril rapidly establishes therapeutic levels in the horse. Emphasizing this swift onset can encourage owner compliance and patience during the initial treatment period. It remains important to follow the full treatment regimen, as indicated, for optimal therapeutic effect in horses with clinical EPM.

BOTTOM LINE

In acute cases, initiating diclazuril therapy early can give your patient the best possible head start against rapidly progressing disease. This concrete pharmacokinetic data can help you confidently guide EPM treatment protocols.

This research was presented at the 2025 International Veterinary Emergency & Critical Care Society Meeting.

ABOUT THE AUTHOR

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Dr. Hepworth-Warren grew up in Indiana and graduated from Purdue University in 2010 with her DVM. Following graduation, she did an internship in Florida and then moved back to the Midwest for an equine internal medicine residency at Iowa State University. After achieving board certification she stayed on for a year at ISU and then spent four years in private practice in New Jersey. In June of 2019, she accepted her current position at NC State University and moved south. Her favorite type of cases are neonatology, respiratory disease and nuerology.

Click here for more information on EPM.

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