

Merck Animal Health Equine Respiratory Update

IN COLLABORATION WITH UNIVERSITY OF CALIFORNIA, DAVIS SCHOOL OF VETERINARY MEDICINE

Equine Rhinitis B Virus Detected with Increasing Frequency

Here's what we know about ERBV, which has been tracked since 2012 through the Equine Respiratory Biosurveillance Program

Equine rhinitis B virus (ERBV) is a lesser-known respiratory pathogen in equine populations belonging to the genus *Erbovirus* within the family Picornaviridae. This virus is recognized for its impact on the respiratory health of horses, with three distinct serotypes identified: ERBV1, ERBV2 and ERBV3. Transmission occurs primarily through respiratory secretions, and the virus can spread easily among horses in close contact.

In 2012, Merck Animal Health added ERBV and equine rhinitis A virus (ERAV) to its Biosurveillance respiratory panel to monitor these viruses more closely. Since then, an upward trend in ERBV disease has been apparent (Figure 1), while very few cases of ERAV have been identified. The clinical relevance of ERBV has yet to be fully determined, which was the impetus for the

2023 paper "[Characterization of Equine Rhinitis B Virus Infection in Clinically Ill Horses in the United States during the Period 2012-2023.](#)"

The objectives of this study were to:

1. Provide information regarding the clinical relevance of ERBV in horses with respiratory disease, and
2. investigate the impact of ERBV coinfection on clinical disease.

Nasal swab samples from 8,684 horses with acute onset of fever and respiratory signs were submitted for qPCR evaluation for equine influenza virus (EIV), equine herpesvirus type 1 and type 4 (EHV-1, EHV-4), *Streptococcus equi* subspecies *equi*, and ERAV and ERBV. Samples were submitted from 45 states between September 2012 and April 2023.



Key findings¹

- A total of 441 samples tested positive for ERBV using qPCR, resulting in an overall positivity rate of 5.08%
- Throughout the study, there was an increased frequency of ERBV-positive samples (Figure 1)
- ERBV was detected as a sole pathogen in 291 cases (66% of positives)
- ERBV was detected as part of coinfection with other pathogens in 150 cases (34% of positives)
 - *S. equi*, EHV-4 and EIV were the most common pathogens coinfecting with ERBV
- Young horses less than a year of age with acute onset of fever and respiratory signs, along with competition horses, were most likely to test positive for ERBV
- Fever, nasal discharge, ocular discharge and cough were the most frequently reported clinical signs in ERBV-positive cases
 - Ocular discharge may be a clinical sign that is overlooked by practitioners
- Seasonality plays a factor in ERBV-positive cases, which are statistically less likely in summer months compared to winter, spring and fall.

¹Schneider, C.; James, K.; Craig, B.W.; Chappell, D.E.; Vaala, W.; van Harrevel, P.D.; Wright, C.A.; Barnum, S.; Pusterla, N. Characterization of Equine Rhinitis B Virus Infection in Clinically Ill Horses in the United States during the Period 2012-2023. *Pathogens* 2023, 12, 1324. <https://doi.org/10.3390/pathogens12111324>

Clinical Relevance of ERBV

The rising frequency of ERBV cases over this 10-year-and-8-month period indicates that clinicians are more likely to see an ERBV case than in the past. This fact makes it even more important to properly characterize the disease and help veterinarians interpret ERBV diagnostics. Prior to this study, it was theorized that coinfection with ERBV may exacerbate the clinical manifestation of disease, prolonging the duration of illness and intensifying the severity of clinical signs in equine patients. However, the results of this study do not support that conclusion. There was not a significant difference in the severity of any of the reported clinical signs between ERBV-positive-sole-pathogen cases and ERBV-positive-coinfection cases. Study authors said vaccination against these pathogens may play a role in the severity of clinical signs, while timing of sampling during the course of disease may also impact reported disease severity.

Horses with ERBV-positive coinfection were significantly more likely to present with nasal discharge and cough when compared to ERBV-negative cases and ERBV-positive-sole-pathogen cases. Study authors also noted that ocular discharge is often an overlooked clinical sign of respiratory disease, and this study underscores its relevance. And while we see more young horses represented in ERBV-positive cases, ERBV cases were seen in every age category. Young horses may be more prone to ERBV, as with many infectious respiratory diseases, due to their immature immune systems. As a result, clinical signs may

be more obvious in young populations. Additionally, ERBV should not be discounted in traveling performance horses, who may experience increased exposure to all respiratory pathogens when commingled with horses from other farms at events.

TAKE HOME MESSAGE

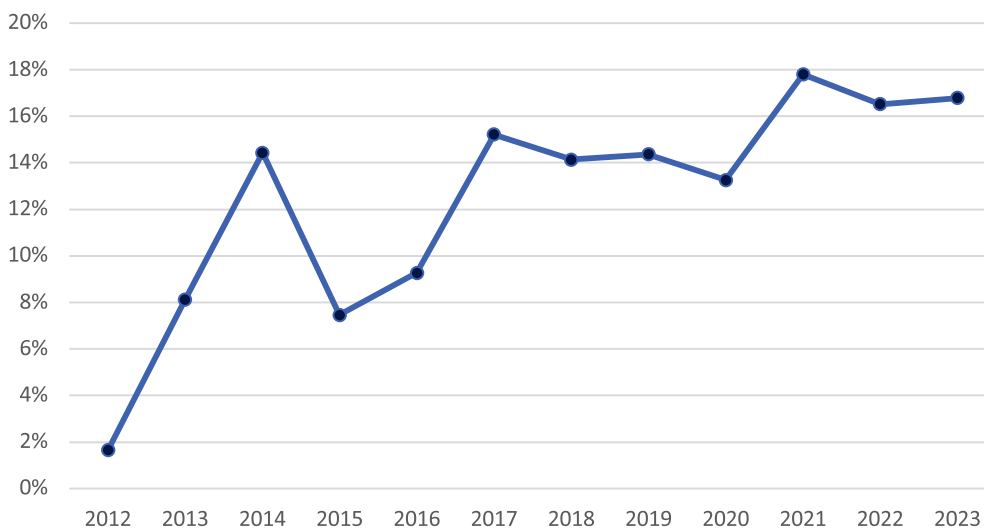
While there is still much to learn about ERBV, the findings from this study clearly support its clinical relevance. Practitioners should not discount the possibility of ERBV in cases presenting with acute upper respiratory signs. Early identification and management can reduce severity of disease for the horse and the chance of disease spread in our horse populations.

Complete study results are available via the [published article](#).

Note: The Respiratory Biosurveillance Program is an ongoing sentinel study. Voluntary submissions were received from representative individual(s) acutely affected in a respiratory outbreak. It is not a comprehensive sampling of every affected animal in an outbreak.

FIGURE 1: ERBV Infection Rates from 2012 to 2023²

(As a percentage of total positive samples)



ERBV qPCR-positive cases have been trending upward since tracking began in 2012.

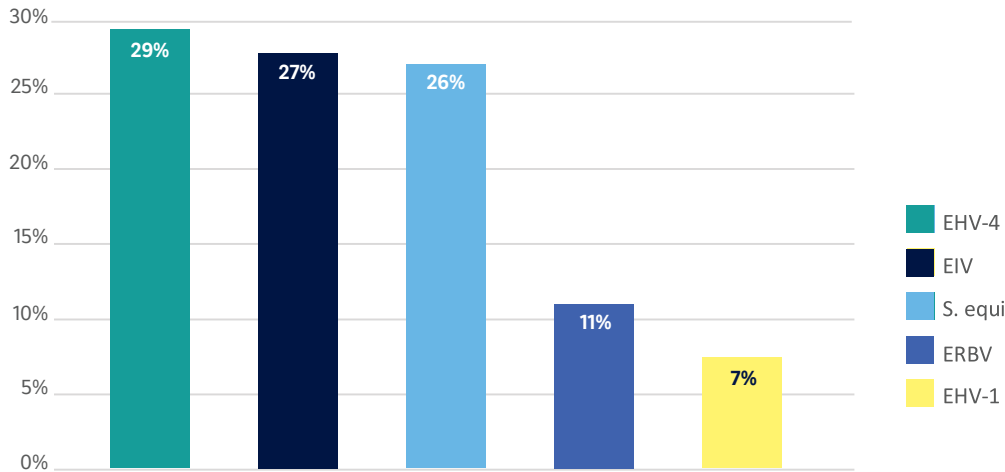


²Merck Animal Health and University of California, Davis (Nicola Pusterla). Infectious Upper Respiratory Disease Surveillance Program. Ongoing research 2008–present.

Respiratory Biosurveillance Program Cumulative Disease Trends

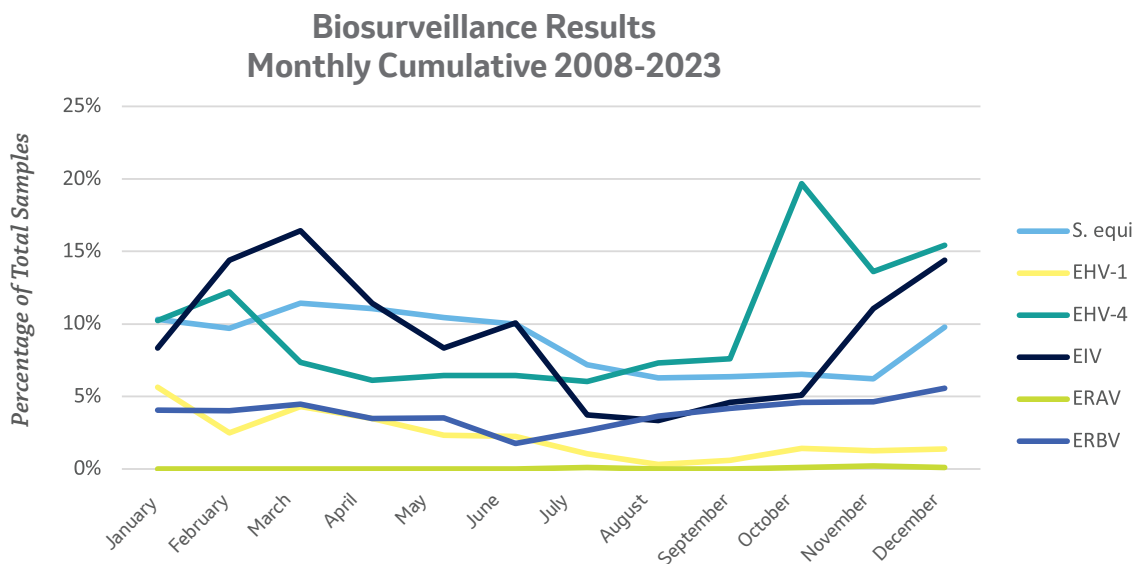
Nearly 12,000 samples have been collected since the Biosurveillance Program began 16 years ago. Of those, 34% have returned positive for one of six pathogens tracked, including equine herpesvirus types 1 and 4 (EHV-1, EHV-4), equine influenza virus (EIV) and *Streptococcus equi* subspecies *equi* (*S. equi*), which have been tracked from the inception of the program, and equine rhinitis A/B viruses (ERAV/ERBV), which were added in 2012.

FIGURE 2: Biosurveillance Program Disease Incidence: March 2008-December 2023²



Through December 2023, EHV-4 was the most diagnosed infectious upper respiratory disease, comprising 29% of all positive samples, followed closely by EIV at 27% and then *S. equi* at 26%. Note, only 0.1% of cases came back positive for ERAV.

FIGURE 3: Seasonal Incidence of Equine Infectious Upper Respiratory Disease²



The monthly cumulative depicts the seasonal effect of respiratory pathogens spanning 16 years of surveillance. EHV-4 continues to be more prevalent in the fall months, in contrast to the other respiratory pathogens (especially EIV) that are more prevalent in the winter and spring months.

Current Six-Month Update

A total of 327 samples were submitted from July to December 2023. Overall, 39% of total samples submitted tested positive for one of the six primary pathogens (*S. equi*, EIV, EHV-4, ERBV, ERAV, EHV-1). During this timeframe, *S. equi* was the most prevalent upper respiratory disease reported, followed by ERBV. EHV-1 was not identified in this time period.

FIGURE 4: Disease Incidence July to December 2023²

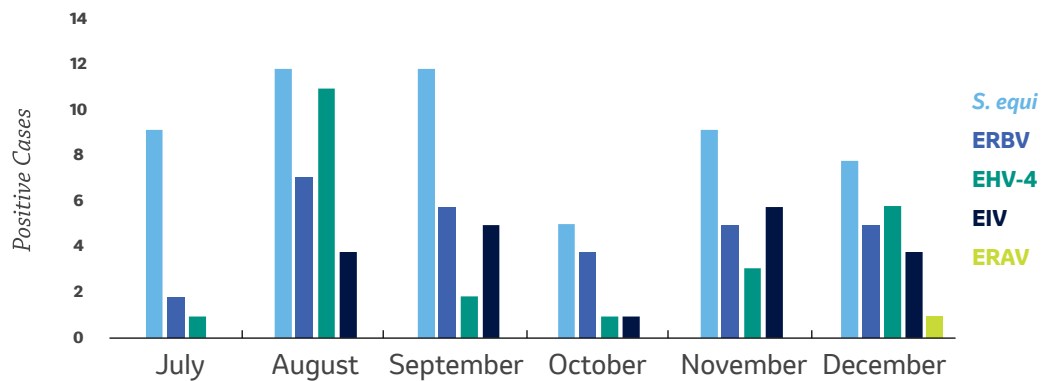
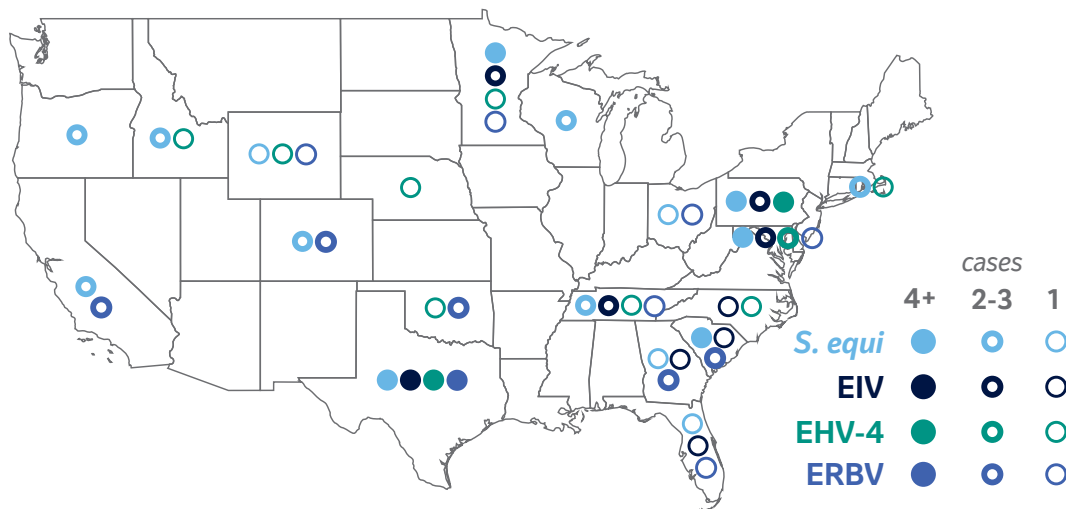


TABLE 1: Primary Demographic Parameters for the Four Major Pathogens (July–December 2023)²

Demographic Summary	<i>S. equi</i> (55 cases)	ERBV (29 cases)	EHV-4 (24 cases)	EIV (20 cases)
Median Age	6 years Range: 2 months – 20 years	3 years Range: 6 months – 32 years	2.5 years Range: 5 months – 18 years	4 years Range: 5 months – 24 years
Predominant Breed(s)	Quarter Horse	Quarter Horse	Quarter Horse	Quarter Horse, Other
Travel	Yes 22% No 69% Unknown 9%	Yes 10% No 76% Unknown 14%	Yes 42% No 58%	Yes 45% No 35% Unknown 20%
Primary Discipline	Show 33% Pleasure 40% Other/Unknown 27%	Show 42% Pleasure 24% Other/Unknown 34%	Show 42% Pleasure 13% Other/Unknown 45%	Show 30% Pleasure 40% Other/Unknown 30%

FIGURE 5: Geographic Representation of the Top Four Pathogens July–December 2023²



Map represents states with positive cases of *S. equi*, ERBV, EHV-4 and EIV during the reporting period (July–December 2023).

PRACTICE TIPS

The Ins & Outs of Vaccination Protocols

This is the fifth and final installment in our series on vaccination recommendations. The series is designed to help you distill the AAEP vaccination guidelines and help clients understand the importance of immunization while reinforcing your specific vaccination recommendations.

Each series will be presented with client-friendly information and guidance for vaccinating horses of a variety of ages and circumstances.

SERIES 5: Vaccinating the performance horse

Vaccination ins and outs may be second nature to you, but clients could have plenty of questions, especially about vaccinating their traveling competition horses. Take a moment to share this vaccination information with your performance horse owners, who may not realize their elite athletes require next-level disease protection.

It's no surprise with all their travel and changing environments, not to mention stress of training and performing, these elite athletes are the horses most likely to suffer from infectious disease. Many horse owners overlook how travel affects their horse's vaccination needs, especially if they're traveling to the southern United States. Even horses considered fully vaccinated may need a West Nile virus (WNV) and Eastern/Western equine encephalomyelitis

(EEE/WEE) booster before traveling to areas with year-round mosquito activity.

Risk-based vaccines must also be managed more intently for the traveling performance horse, as they are at increased risk of highly contagious respiratory diseases like EHV-1, EHV-4, EIV and *S. equi*. In addition to stringent biosecurity measures, AAEP recommends equine athletes be vaccinated against EHV-1&4 and EIV at six-month intervals.

Flu Avert® I.N. and PRESTIGE® Prodigy® provide a powerful immune punch for the traveling performance horse, eliciting a complete adaptive immune response, including humoral and cell-mediated immunity. Flu Avert I.N. is a non-adjuvanted intranasal vaccine, alleviating injection site reaction concerns. It does not require a booster dose and features a rapid onset of immunity, within five to seven days of administration,³ which is why Flu Avert I.N. is recommended for use during outbreaks.⁴ PRESTIGE Prodigy produces a comprehensive antibody and cell-mediated immune response against EHV-1 and is proven to reduce nasal virus shedding.^{5,6}

As your clients hit the road this spring, reinforce the [AAEP vaccination guidelines](#) for adult horses and pass along the tips below to support your vaccination recommendations



³ Townsend HGG. Onset of protection against live-virus equine influenza challenge following vaccination of naive horses with a modified-live vaccine. Unpublished data.

⁴ AAEP Vaccination Guidelines: aaep.org

⁵ Data on file. Merck Animal Health.

⁶ Holmes MA, Townsend HGG, Sussey S, Breathnach C, Barnett C, Holland RE, Lunn DP: Immune responses to commercial equine vaccines. AAEP Proceedings, Vol. 49, 2003.

OWNER TIPS

Vaccinating the Performance Horse

Strenuous exercise, performance and long-distance transportation can all suppress the immune system, increasing your horse's susceptibility to infectious disease and potentially decreasing response to vaccination. As a result, more frequent vaccinations may be required. Talk with your veterinarian, who will help design a customized plan to help support your horse's immune performance. Basic principles of this plan may include:

- Ensure your horse is protected against the right diseases by reviewing the [AAEP vaccination guidelines](#) and talking with your veterinarian. AAEP recommends equine athletes be vaccinated against equine herpesvirus types 1 & 4 (EHV-1&4) and equine influenza virus (EIV) at six-month intervals. Performance horses of all ages are at increased risk of exposure for infectious respiratory diseases, most importantly EHV and EIV.
- Geography impacts vaccination recommendations. If you are traveling to the southern United States, for example, where mosquito populations remain active year-round, a West Nile virus (WNV) and Eastern/Western equine encephalomyelitis (EEE/WEE) booster may be advisable.
- No matter where you're headed, remember to get booster vaccines on board at least two weeks before the event to ensure your horse has adequate time to mount an immune response.
- With highly contagious diseases such as strangles, EHV and EIV, vaccination alone will not prevent disease transmission. Good biosecurity protocols are mandatory.
- The Equine Disease Communication Center (EDCC) provides several great [biosecurity tips](#). The EDCC is also a great resource for disease outbreak information.



About the Newsletter

This biannual newsletter provides information generated through and related to the Biosurveillance Program. Driven by an Unconditional commitment to the horse and those who serve them, Merck Animal Health is providing this newsletter to veterinarians to help them stay up to date on the latest trends and historical information the study has yielded to date. Merck Animal Health Equine Veterinary Professional Services and Nicola Pusterla, DVM, PhD, DACVIM, AVDC-Equine, UC Davis, will provide technical veterinary advice, interpretation and case management support.

If you have questions about the program please call our team at (866) 349-3497, or email us at the addresses listed below. For more information and to access past issues of the newsletter, visit www.Merck-Animal-Health-USA.com.

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Relevant Supporting Research

For more information on the latest respiratory disease published research from Merck Animal Health, click on the links below.

1. [Characterization of Equine Rhinitis B Virus Infection in Clinically Ill Horses in the United States during the Period 2012-2023](https://doi.org/10.3390/pathogens12111324) Schneider, C.; James K., Craig, B.W.; Chappell, D.E.; Vaala, W.; van Harreveld, P.D.; Wright, C.A.; Barnum, S.; Pusterla, N. Pathogens 2023, 12, 1324.
2. [Voluntary Biosurveillance of Streptococcus equi Subsp. equi in Nasal Secretions of 9409 Equids with Upper Airway Infection in the USA](https://doi.org/10.3390/vetsci10020078). Jaramillo-Morales, C.; James, K.; Barnum, S.; Vaala, W.; Chappell, D.E.; Schneider, C.; Craig, B.; Bain, F.; Barnett, D.C.; Gaughan, E.; et al. Vet. Sci. 2023, 10, 78.
3. [Voluntary Surveillance Program for Equine Influenza Virus in the United States during 2008–2021](https://doi.org/10.3390/pathogens12020192). Chappell, D.E., Barnett, D.C.; James, K.; Craig, B.; Bain, F.; Gaughan, E.; Schneider, C.; Vaala, W.; Barnum, S.M.; Pusterla, N. Pathogens 2023, 12, 192.
4. [Frequency of Detection and Prevalence Factors Associated with Common Respiratory Pathogens in Equids with Acute Onset of Fever and/or Respiratory Signs \(2008-2021\)](https://doi.org/10.3390/pathogens11070759). Pusterla, N.; James, K.; Barnum, S.; Bain, F.; Barnett, D.C.; Chappell, D.; Gaughan, E.; Craig, B.; Schneider, C.; Vaala, W. Pathogens 2022, 11, 759.
5. [Prevalence Factors Associated with Equine Influenza Virus Infection in Equids with Upper Respiratory Tract Infection from 2008 to 2019](#). Vaala W, Barnett DC, James K, Chappell D, Craig B, Gaughan E, Bain F, Barnum SM, Pusterla N. AAEP Proceedings. 2019 Vol 65.
6. [Prevalence Factors Associated with EHV-2/5 Among Equines with Signs of Upper Respiratory Infection in the US](#). James, K., Vaala, W., Chappell, D., Barnett, D.C., Gaughan, E., Craig, B., Bain, F., Pusterla, N. ACVIM 2017 abstract.
7. [Prevalence factors associated with equine herpesvirus type 1 infection in equids with upper respiratory tract infection and/or acute onset of neurological signs from 2008 to 2014](#) Pusterla, N., Mapes, S., Akana, N., Barnett, D.C., Mackenzie, C., Gaughan, E., Craig, B., Chappell, D., Vaala, W. Vet Rec. 2015; doi: 10.1136/vr.103424.
8. [Voluntary Surveillance Program for Equine Influenza Virus in the United States from 2010 to 2013](#) Pusterla, N., Kass, P.H., Mapes, S., Wademan, C., Akana, N., Barnett, D.C., Mackenzie, C., Vaala, W. J Vet Intern Med 2015; 29:417-422.
9. [Surveillance programme for important equine infectious respiratory pathogens in the USA](#) Pusterla, N., Kass, P.H., Mapes, S., Johnson, C., Barnett, D.C., Vaala, W., et al. Vet Rec. 2011 July 2;169(1):12. doi: 0.1136/vr.d2157.
10. [Voluntary surveillance program for important equine infectious respiratory pathogens in the United States](#) Pusterla, N., Kass, P.H., Mapes, S., Johnson, C., Barnett, D.C., Vaala, W., Gutierrez, C., et al. AAEP Proceedings 2010.

About the Biosurveillance Program

Since March of 2008, Merck Animal Health has been conducting an ongoing, voluntary equine biosurveillance program to study the prevalence and epidemiology of relevant viral and bacterial respiratory pathogens. Nearly 12,000 samples from U.S. equids of all ages, genders and breeds presenting with fever and signs of acute upper respiratory disease and/or acute neurological disease have been collected since the study began. Samples are submitted by participating Merck Animal Health customer clinics and tested via quantitative PCR at the University of California, Davis School of Veterinary Medicine (UC Davis). **To be eligible for testing, horses must have an unexplained fever (T ≥ 101.5°F) AND one or more of the following signs: Lethargy, nasal discharge, cough and/or acute onset of neurologic disease.** The results are returned to the Merck Animal Health customer within 24 hours of laboratory receipt of sample and provide invaluable diagnostic and treatment information.

Four-Fold Purpose:

- 1) To provide a valuable diagnostic tool to participating Merck Animal Health customers to assist in obtaining an accurate and timely diagnosis during an acute respiratory disease outbreak so they can provide optimal treatment, quarantine recommendations and vaccination strategies to their clients and patients.
- 2) To provide the horse industry with a better understanding of the prevalence and epidemiology of these respiratory pathogens.
- 3) To identify and monitor the current circulating strains of major equine respiratory pathogens.
- 4) To evaluate the efficacy of current vaccination protocols.



The Science of
Healthier Animals