

Merck Animal Health Equine Respiratory Update

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

Research Published from 13 Years of the Equine Respiratory Biosurveillance Program

Equine influenza and equine herpesvirus type 4 are the two most prevalent viruses

In July 2022, "[Frequency of Detection and Prevalence Factors Associated with Common Respiratory Pathogens in Equids with Acute Onset of Fever and/or Respiratory Signs \(2008-2021\)](#)" was published documenting findings from the largest contemporary biosurveillance data set in the United States. This is the seventh publication from the Biosurveillance Program and the learnings wouldn't be possible without the more than 260 participating clinics across the United States. This study is perhaps most unique due to the large sample size and geographic distribution (44 U.S. states) and its focus on a well-characterized set of respiratory pathogens.

Since 2008, Nicola Pusterla, DVM, PhD, DACVIM, AVDC-Equine, and his team at the University of California, Davis,

"The program is so dynamic and evolving and the information gained has helped increase awareness of respiratory infections."

-Nicola Pusterla, DVM, PhD, DACVIM, AVDC-Equine



Infectious Disease Research Laboratory have partnered with Merck Animal Health to make the Equine Respiratory Biosurveillance Program possible.

"For me the most valuable outcome of the Biosurveillance Program is not only the results and their implications," said Pusterla, lead study author. **"The fact that every case is well documented with selected risk factors makes the number crunching so exciting. The program is so dynamic and evolving and the information gained has helped increase awareness of respiratory infections.** Especially during a time when horse movement and the size of equestrian events are increasing, it is good to know how to best mitigate negative outcomes. Better defining the demographics, risk

factors and clinical signs associated with various pathogens allows the equestrian community to engage in selective measures to prevent disease. I am grateful for the opportunity our team has had to work so closely with the industry in establishing and running this Biosurveillance Program."



Merck Animal Health Equine Respiratory Update

Study High Points¹

Over a period of 13 years, 10,296 U.S. horses with acute onset of fever and respiratory signs were tested via nasal secretion (qPCR) for detection of equine influenza virus (EIV), equine herpesvirus-1 (EHV-1), equine herpesvirus-4 (EHV-4), equine rhinitis A and B viruses (ERVs), and *Streptococcus equi* subspecies *equi* (*S. equi*).

Clinical signs were similar between viral and bacterial respiratory infections, underscoring the importance of testing to confirm disease cause and proper management practices. Fever (>101.5° F) was the most frequently reported clinical sign (73% of cases), followed by nasal discharge (67.8%), lethargy (65.3%), anorexia (53.8%) and coughing (43.5%).



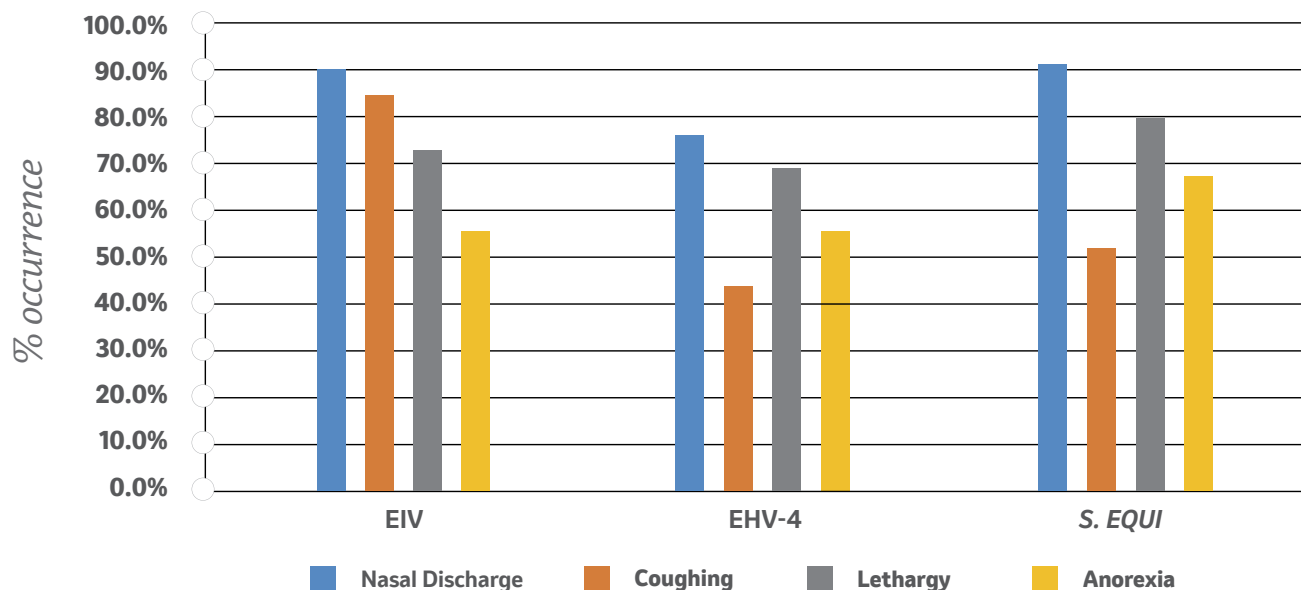
- Single infections were detected in 21.1% of total sample submissions.
- Multiple pathogens were detected in 2.7% of all samples submitted.
- Together, EIV and EHV-4 made up 63% of all single infections.
- *S. equi* was detected in 22%, ERV in 11% and EHV-1 in 4% of all positive samples.
- 76.2% of total samples were negative for all six primary pathogens tested.
- There was a distinct seasonality to EHV-4 (more likely in the fall), as well as to EIV and EHV-1 (more likely in the spring).
- Viral infections were more common in young performance horses, while *S. equi* infections were more commonly found in older pleasure horses.

TABLE 1: Comparing Seasonality and Signalment Among Top 3 Respiratory Pathogens (2008-2021)¹

Pathogens	Seasonal Frequency	Age	Breed	Use	Transport
EIV	Spring	1-9 years	Quarter Horse	Pleasure 40.1% Competition 35.6%	No (53.5%)
EHV-4	Fall	<1-4 years	Quarter Horse, Thoroughbred	Competition 45.2% Pleasure 27.8%	No (66.5%)
<i>S. equi</i>	Winter & Spring	1-9 years	Quarter Horse	Pleasure 41.2% Competition 34.7%	No (61.4%)

¹Pusterla, N.; James, K.; Barnum, S.; Bain, F.; Barnett, D.C.; Chappell, D.; Gaughan, E.; Craig, B.; Schneider, C.; Vaala, W. Frequency of Detection and Prevalence Factors Associated with Common Respiratory Pathogens in Equids with Acute Onset of Fever and/or Respiratory Signs (2008-2021). *Pathogens* 2022, 11, 759. <https://doi.org/10.3390/pathogens11070759>.

FIGURE 1: Comparing Clinical Signs Among Top 3 Respiratory Pathogens (2008-2021)*



* Median temperature for each pathogen: 103.0°F, occurring >87% of the time.

When compared to all horses with known respiratory infections:

- EIV positive cases were more commonly associated with recent transportation history and multiple affected horses on the property—a likely reflection of its contagiousness.
- While clinical signs were fairly consistent across pathogens, **coughing was a clinical hallmark of EIV infection.**
- EHV-4 positive cases were seen with greater detection rate in Thoroughbreds and had slightly higher rectal temperature and lower reported detection of nasal discharge and coughing.
- *S. equi* positive cases were more likely in horses older than 1 year of age and displayed higher rates of nasal discharge and anorexia.

Of additional note, 58% of positive cases had an unknown vaccination history.

“This is an amazing program that has been running since 2008,” added Pusterla. “From enrolling the clinics, to identifying an index case, to running the sample and reporting the results, it takes a whole village to make this happen.”

Merck Animal Health has not only been a tremendous partner in this project, but it has also helped advance the science with the goal to help clients, veterinarians and horses.”

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



S. equi Cases Skyrocket During 6-Month Reporting Period

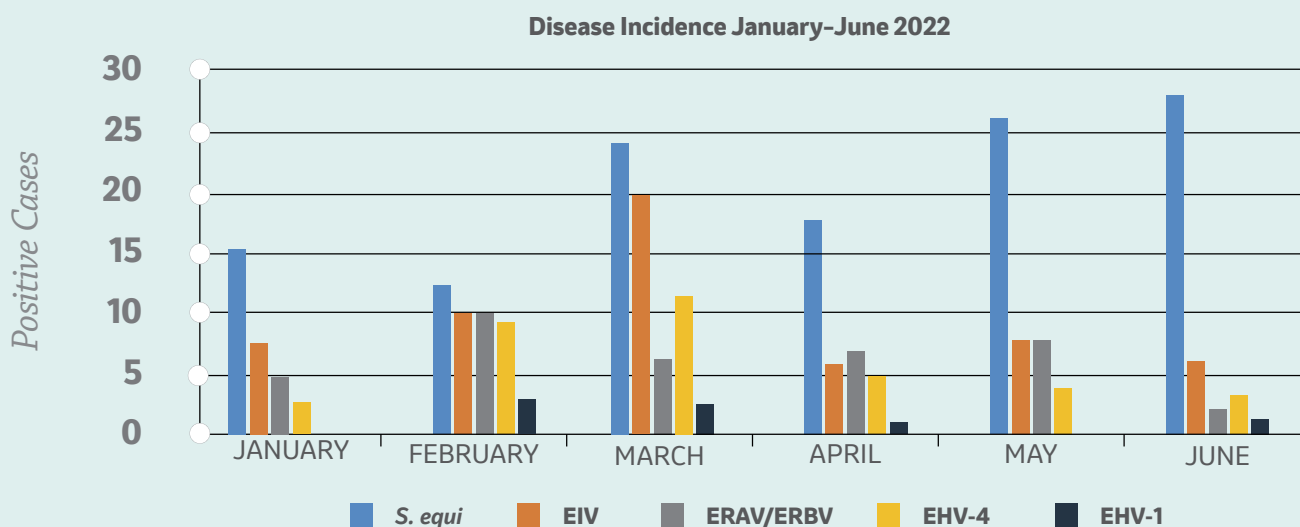
An unusually high number of *S. equi* subspecies *equi* positive cases were reported from January to June 2022 (114 vs. 37 in 2021). While there may be many reasons for this uptick, study researchers postulate that *S. equi* may thrive better during warm weather. During the most recent 6-month period, a large number of cases came from regions with moderate climates, and the most significant upticks occurred March through June. It is worth noting that 14 years of surveillance supports an

observed increase in the overall incidence of *S. equi* during the warmer months of the year (April – September). It is also worth reiterating that the Biosurveillance Program continues to show a high frequency of *S. equi* in nontraveling pleasure horses. During the most recent six-month period, 40% of *S. equi* cases were in show horses, and 70% of cases were in horses that had not traveled recently. Additionally, while the median age was 9 years, 34% of cases during this timeframe were in horses 1 to 5 years.

Strangles is a ubiquitous disease, and one of the most difficult challenges for caretakers is properly identifying subclinically infected carrier animals. Biosecurity remains paramount, particularly considering there are marginal preventive measures for *S. equi*. We will keep an eye on this trend and report additional findings as they become relevant in future newsletters.

FIGURE 2: 6-Month Disease Trends January to June 2022²

A total of 471 samples were submitted from January to June 2022. Overall, 54% of total samples submitted tested positive for one of the six primary pathogens (*S. equi*, EIV, EHV-4, ERAV/ERBV, EHV-1). **The high percentage of positive cases should be noted as it reflects the quality of samples submitted. Without good sample quality it is difficult to accurately identify disease.** Thank you to the submitting veterinarians for continuing to collect high quality samples.

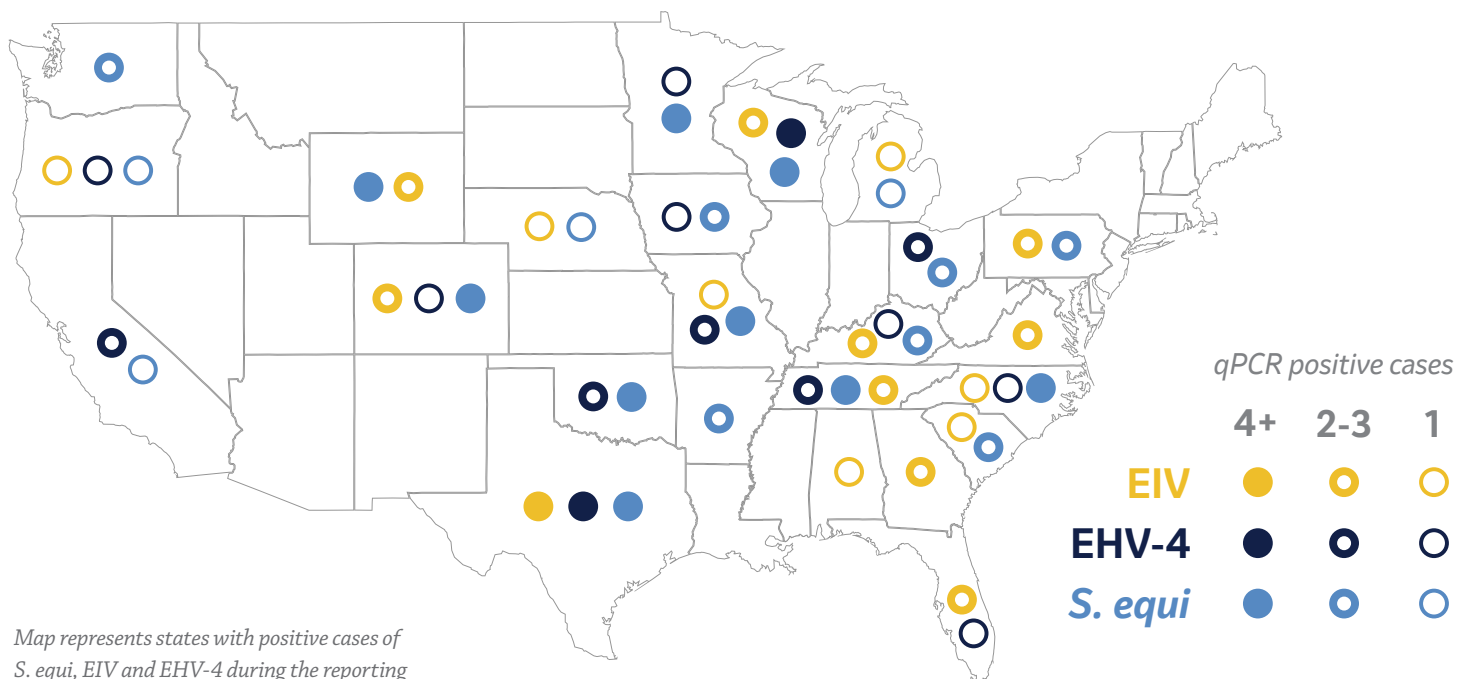


*The most recent six months of data (January to June 2022) identifies *S. equi* and EIV as the most prevalent infectious upper respiratory diseases reported.*

TABLE 2: Summary of Primary Demographic Parameters for the Three Major Pathogens
(January-June 2022)²

Demographic Summary	S. equi (114 cases)	EIV (58 cases)	EHV-4 (36 cases)
Median Age	9 years Range: 9 months – 27 years	5 years Range: 1 year – 25 years	2.5 years Range: 8 months – 17 years
Predominant Breed(s)	Quarter Horse	Quarter Horse	Quarter Horse
Travel	No 70% Yes 20% Unknown 10%	Yes 47% No 38% Unknown 15%	No 61% Yes 36% Unknown 3%
Primary Discipline	Show 40% Pleasure 31% Other/Unknown 29%	Pleasure 38% Show 36% Other/Unknown 26%	Show 61% Pleasure 20% Other/Unknown 19%

FIGURE 3: Geographic Representation of the Top Three Pathogens (January-June 2022)²



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

PRACTICE TIPS

The Ins & Outs of Vaccination Protocols

This is the third 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. After all, client communications are a critical part of what you do every day. You're in the driver's seat when it comes to educating and preparing horse owners for what to expect in regard to vaccination.

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

SERIES 3: Vaccinating the pregnant mare

Vaccination ins and outs may be second nature to you, but clients could have plenty of questions, especially about vaccinating broodmares. Take a moment to share this critical vaccination information with your broodmare owners.

For pregnant mares, elective immunosuppression characterized by down-regulation of Th-1 responses is considered important to maintaining pregnancy. This phenomenon may help explain an increased risk

of reactivation of latent EHV-1 or dormant infections like *Salmonella* spp. and *Streptococcus equi* infections, rendering the late-term broodmare a potential source for these diseases. Pregnancy-associated immunosuppression might also increase the late-term broodmare's susceptibility to certain infectious diseases. Therefore, it is important to adhere to appropriately timed prepartum vaccination protocols, as outlined in the AAEP guidelines.

AAEP VACCINATION GUIDELINES

Download and share the [Quick Guide to Vaccinating During Gestation](#) with your clients and encourage them to use the features of the **Merck Animal Health Foal Care ProgramSM** to manage their broodmare's vaccination schedule. Visit the website, enter the breeding date and automatically receive appropriately timed deworming treatments and vaccinations based on AAEP guidelines. Clients have the option to add the recommended dates to their calendar, so they receive timely reminders. Bonus: The program also provides foal care reminders through the first year of the foal's life. Access the Foal Care Program features at merck-animal-health-equine.com/programs/foal-care.



³ USDA NAHMS 2015 Equine Study. https://www.aphis.usda.gov/animal_health/nahms/equine/downloads/equine15/Equine15_is_Vaccination.pdf (accessed 2May2022)

OWNER TIPS

Critical vaccinations for the pregnant mare

Talk with your veterinarian early on about a vaccination plan for your broodmare. EHV-1 vaccination is a crucial safeguard for your mare's pregnancy, since EHV-1 is the leading cause of infectious viral abortions in mares. To reduce the risk of EHV-1 abortion, vaccinate your mare using an EHV-1 vaccine shown to be effective against abortion and respiratory disease, such as PRESTIGE® Prodigy®, at the start of the fifth, seventh and ninth months of gestation. All horses in close contact with broodmares, including barren mares, stallions and teaser stallions, should also be maintained on a rigorous EHV-1 vaccination program. Reduce your pregnant mare's exposure to groups of young horses and any new arrivals that may potentially be shedding EHV-1.

Additionally, administering booster vaccinations four to six weeks before foaling is important for stimulating the mare to produce high levels of protective antibodies in colostrum during the late stages of pregnancy. The newborn foal relies on ingestion of colostrum and absorption of these antibodies during the first 12 to 24 hours of life for protection against a wide variety of viral and bacterial diseases occurring in the early post-natal period.

Keep track of your broodmare's healthcare milestones with the **Merck Animal Health Foal Care ProgramSM** - simply visit the website and enter your mare's breeding date to receive appropriately-timed vaccination reminders.

Quick Guide to Vaccinating During Gestation³

(For previously vaccinated broodmares)

Gestation Period	Recommended Vaccines	At-Risk Vaccines*
5 months of gestation	PRESTIGE® Prodigy® EHV-1 (reproductive protection)	
7 months of gestation	PRESTIGE® Prodigy® EHV-1 (reproductive protection)	
8 months of gestation		Rotavirus first dose (3-dose series) Botulism first dose, if mare is not current (3-dose series)
9 months of gestation	PRESTIGE® Prodigy® EHV-1 (reproductive protection)	Rotavirus second dose Botulism second dose
10 months of gestation (pre-foaling)	Rabies (if not given pre-breeding), EWT, WNV, EIV, EHV-1 & 4 (respiratory protection)	Rotavirus third dose Botulism third dose Strangles intramuscular (IM) Potomac horse fever

*Reminder: Vaccinations against strangles, Potomac horse fever, botulism and rotavirus are recommended only if there is a high risk of disease in your region or on your farm. If your mare will be sent to another farm for re-breeding, consider the risk of disease on that farm to plan vaccinations accordingly.

The American Association of Equine Practitioners (AAEP) vaccination guidelines for adult horses offer a great explanation of vaccination recommendations tailored to the pregnant mare. **Please consult with your veterinarian on all vaccination programs.**



Click to download

³Adapted from AAEP core and risk-based vaccination guidelines for broodmares (www.aaep.org)

About the Newsletter

This biannual newsletter provides information generated through and related to the Biosurveillance Program. Merck Animal Health is passionate about this program and is providing this newsletter to customer 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.

Dr. Bryant Craig
bryant.craig@merck.com

Dr. Fairfield Bain
fairfield.bain@merck.com

Dr. Duane Chappell
duane.chappell@merck.com

Dr. Chrissie Schneider
chrissie.schneider@merck.com

Dr. Cara Wright
cara.wright@merck.com

Dr. Philip van Harreveld
philip.van.harreveld@merck.com

Dr. Nicola Pusterla
npusterla@ucdavis.edu

Relevant Supporting Research

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

- 1) "[Frequency of Detection and Prevalence Factors Associated with Common Respiratory Pathogens in Equids with Acute Onset of Fever and/or Respiratory Signs \(2008-2021\)](#)." 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. <https://doi.org/10.3390/pathogens11070759>
- 2) "[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.
- 3) "[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.
- 4) "[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.
- 5) "[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.
- 6) "[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.
- 7) "[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. More than 10,900 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: Depression, nasal discharge, cough and/or acute onset of neurologic disease.** The results are then returned to the Merck Animal Health customer within 24 hours 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

Copyright © 2022 Merck & Co., Inc., Rahway, NJ, USA and its affiliates.
All rights reserved. US-PRT-220600019

