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Merck Animal Health Equine Respiratory Update

In Collaboration with the University of California, Davis School of Veterinary Medicine

Biosurveillance Program Reaches Sample Milestone

Recently enrolled program participant found big value in 10,000th sample submission

In late April, a new milestone was reached for the Equine Respiratory Biosurveillance Program when sample number 10,000 arrived at the UC Davis Equine Infectious Disease Research Laboratory. An unsuspecting veterinarian soon thereafter received a surprise visit from Earl Gaughan, DVM, DACVS, Senior Equine Professional Services Veterinarian.

"I was pretty shocked when I got the call that I had been the 10,000th sample submission," said Shelby Arrieta, DVM, of Ponderosa Equine in Parker, Colorado. "Especially since it was my very first submission with the program."

> **"It seems fitting that our 10,000th sample was an equine influenza case."**
> *-Bryant Craig, DVM*

Dr. Arrieta was recently enrolled, so it came as quite a shock to be recognized on such a momentous occasion for the program. While new to the Biosurveillance Program, Dr. Arrieta was quick to understand its benefits.

"Due to cost of testing, we often have horses with fevers and other respiratory signs that we treat without ever knowing the cause," said Dr. Arrieta. "Being able to offer this test has allowed us to give owners answers and target our therapy when indicated.

The most beneficial aspect is that we are monitoring outbreaks and strains of virus-causing disease. I think it is so important because that translates to making our vaccinations more effective in protecting horses."

The Biosurveillance program is now in its 14th year and continues to deliver valuable insights on infectious upper respiratory disease to program participants and the equine industry at large. Among the top benefits of this program, perhaps none outweigh the advancements made in understanding and responding to increasing equine influenza cases.

"It seems fitting that our 10,000th sample was an equine influenza case," said Bryant Craig, DVM, Senior Equine Professional Services Veterinarian, reflecting on the program milestone earlier this year.

Dr. Arrieta said it was a bit of an eye-opening moment for her client.

"We recommend flu/rhino vaccination twice a year, although some clients opt to only have their horses vaccinated once a year," Dr. Arrieta said. "One of those clients' horses had high fever and cough earlier this year, about seven months after vaccination. He tested positive for equine influenza virus and now his owners will vaccinate him twice a year going forward."

In June, Merck Animal Health's Dr. Earl Gaughan presented Dr. Shelby Arrieta with a special commemorative certificate and copy of Equine Infectious Diseases *(2nd Edition). Dr. Arrieta submitted the 10,000th sample for the Biosurveillance Program.*

Equine Respiratory Biosurveillance Program
AT-A-GLANCE

- Ongoing program since 2008
- Largest voluntary equine infectious upper respiratory biosurveillance data set ever created
- More than 10,000 samples collected
- Monitors six infectious upper respiratory disease pathogens:
  - Equine herpesvirus types 1 and 4 (EHV-1, EHV-4)
  - Equine influenza virus (EIV)
  - *Streptococcus equi* subspecies *equi* (strangles)
  - Equine rhinitis A/B viruses (ERAV/ERBV)
- Houses one of the largest collections of influenza isolates
  - On the next page, read more on how these isolates are being used to monitor current flu threats
- 24-hour diagnostic turnaround through UC Davis Equine Infectious Disease Research Laboratory
- Six published research papers
- Ten abstracts presented at four national and six international conferences
- Samples collected from across the United States, representing more than 40 states

Key Program Findings[1]

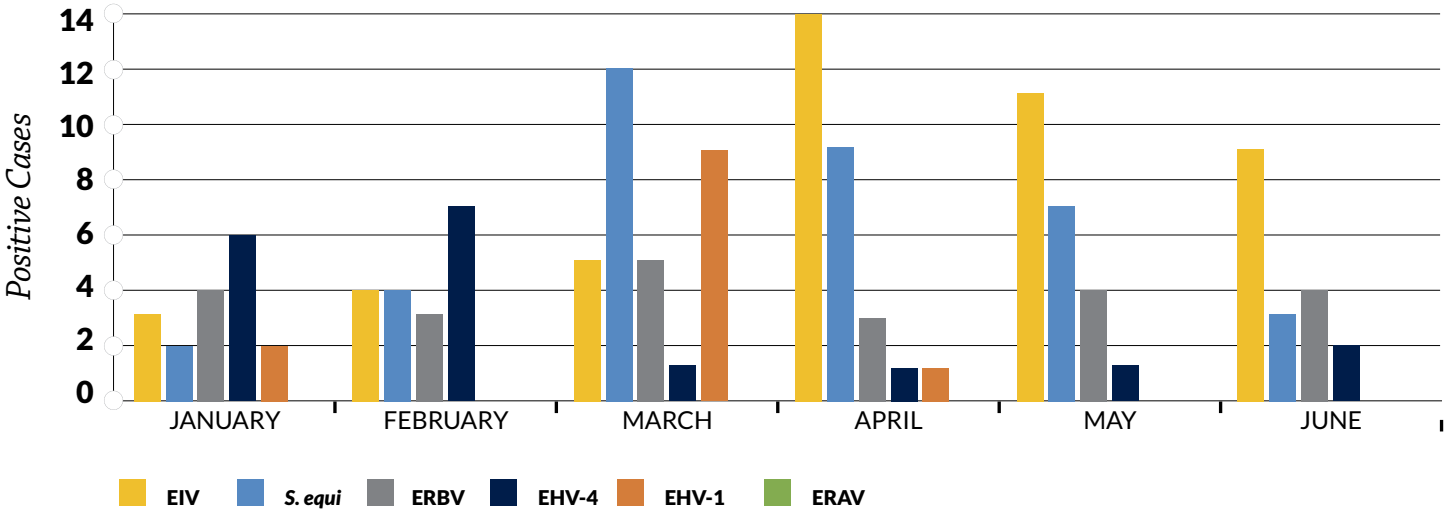
- EHV-4 and EIV are the most prevalent infectious upper respiratory pathogens
- Documented important influenza antigenic drift
- Birthplace of Florida '13 influenza vaccine strain isolate
- Age does not define susceptibility to certain infectious respiratory disease pathogens
- Travel is a significant risk factor
- A definite seasonality to disease outbreaks is present
- Biosecurity plus vaccination offers the best protection

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

Another Active Flu Season for Horses

Six-month activity continues to show considerable equine influenza cases. Of the more than 367 samples collected January through June 2021, EIV accounted for 35% of positive cases. *S. equi* accounted for 28% of positive cases. Overall, 36% of total samples submitted tested positive for one of the six primary pathogens (*S. equi*, EHV-4, EIV, ERBV, EHV-1, ERAV).

FIGURE 1: Six-Month Disease Trends January to June 2021[1]



Ongoing Influenza Isolate Sequencing Helps Us Understand What's Circulating

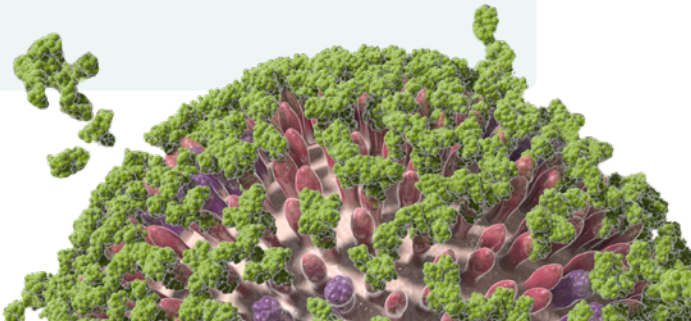
Merck Animal Health continues to periodically sequence influenza isolates from the Biosurveillance Program to evaluate whether commercially available vaccine strains—including our own Florida '13—provide adequate protection against today's circulating field strains of influenza. Ongoing sequencing of recent outbreaks spanning 2013 to 2021 demonstrates Florida '13 continues to be highly relevant to equine influenza circulating today in our U.S. horse population.[2]

Case samples isolated through the Equine Respiratory Biosurveillance Program:

- 76 samples sequenced from a total of 756 EIV(+) samples
- February 2013–June 2021
- 21 U.S. states
- Broad age-range of horses (6 months to 17+ years of age)
- Representative of real-life challenge and sick horse

RESULTS

1. Only Florida '13 demonstrated key site similarity to all isolates from outbreaks
2. Ohio '03 shared only slight key site similarity to today's EIV
3. Kentucky '97 shared no key site similarity to today's EIV



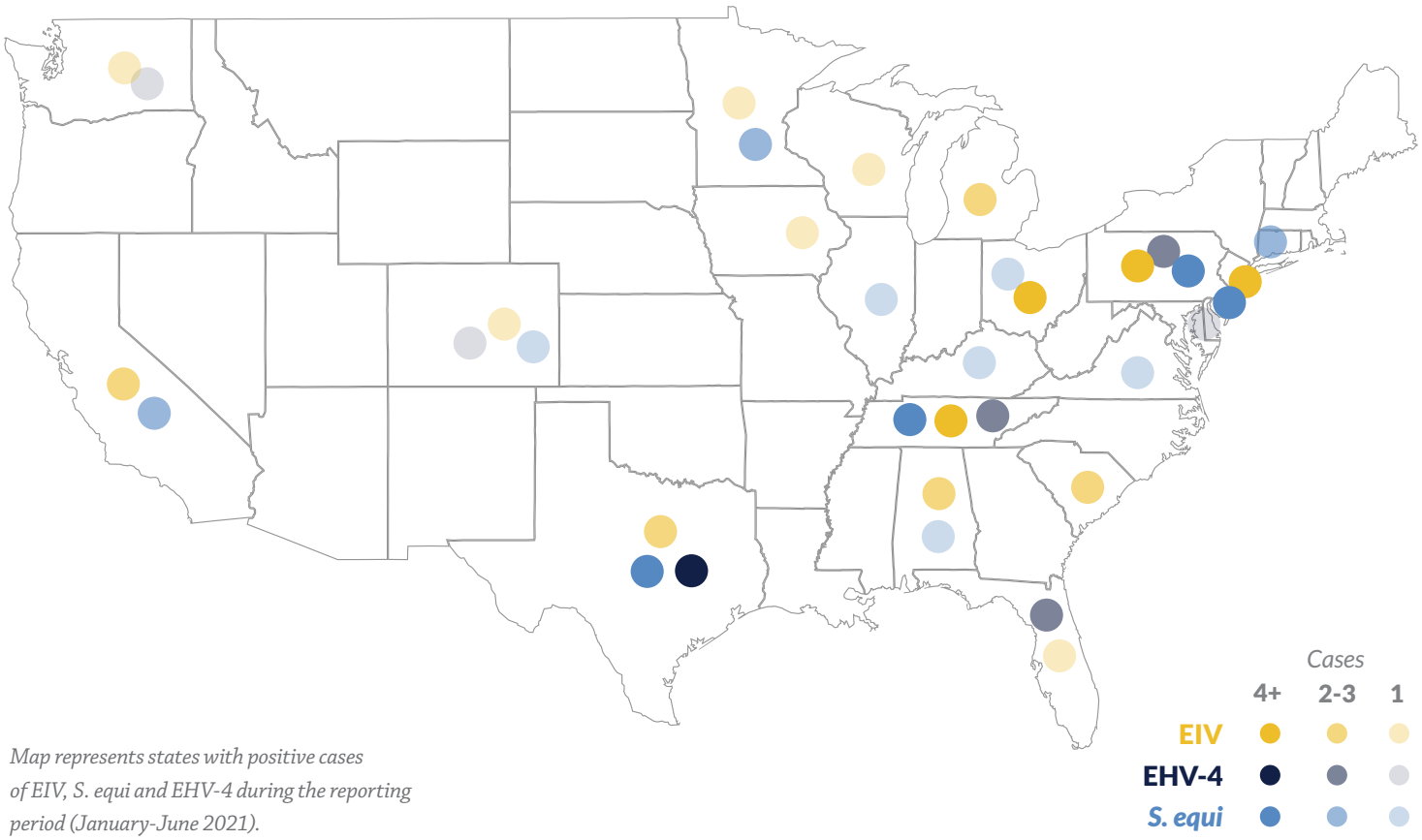
[2]Data on file, Merck Animal Health

TABLE 1: Primary Demographic Parameters for the Three Major Pathogens *(January-June 2021)*[1]

Demographic Summary	EIV (46 cases)	*S. equi* (37 cases)	EHV-4 (16 cases)
Median Age	9 years Range: 11 months – 22 years	6 years Range: 2 – 22 years	5 years Range: 1 – 20 years
Predominant Breed(s)	Quarter Horse	Quarter Horse	Quarter Horse
Travel	**Yes 52%** No 44% Unknown 4%	**No 57%** Yes 38% Unknown 5%	**No 81%** Yes 19%
Primary Discipline	Show 33% Pleasure 33% Other/Unknown 34%	Show 46% Pleasure 22% Other/Unknown 32%	Show 50% Pleasure 38% Other/Unknown 12%

Of note, most EHV-4 positive cases were in non-traveling horses (81%), reiterating the importance of vaccination and proper biosecurity measures for non-traveling horses.

FIGURE 2: Geographic Representation of the Three Major Pathogens *(January–June 2021[1])*



Map represents states with positive cases of EIV, S. equi and EHV-4 during the reporting period (January-June 2021).

[1]Merck Animal Health and University of California, Davis School of Veterinary Medicine (Nicola Pusterla). Infectious Upper Respiratory Disease Surveillance Program. Ongoing research 2008-present.

PRACTICE TIPS

The Ins & Outs of Vaccination Protocols

Welcome to a new series on vaccination recommendations. This is designed to help you distill the 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 when it comes to vaccination.

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

SERIES 1: FOALS

Timing of the first vaccinations is critical. The maternally derived colostral antibodies that provide the foal with temporary protection are the same antibodies that can prevent the foal from mounting an acceptable immune response to vaccines that are administered too early. A proper priming series of vaccinations around 4 to 6 months of age followed by well-timed boosters are key to getting the foal off to a strong immunological start to life.

Save and share the following client guidance for vaccinating foals, along with reference to the American Association of Equine Practitioners (AAEP) vaccination guidelines for foals. Clients will benefit from understanding the importance of properly vaccinating their naïve foal, and you'll have a great discussion starter for client conversations.

DISEASE	**Foals and Weanlings** (<12 months of age) *of mares vaccinated in the prepartum period against the disease indicated*	**Foals and Weanlings** (<12 months of age) *of unvaccinated mare or lacking vaccination history*

AAEP VACCINATION GUIDELINES

OWNER TIPS

Foal Vaccination Guidelines

First Year of Life

Foals acquire early disease protection through maternal antibodies in the vaccinated dam's colostrum. Eventually, maternal antibodies decline, and your foal needs the added protection that develops following proper immunization. The best vaccination program is one that is tailored to the specific needs of your farm and your foals. Here are the basic tenets of vaccination for foals:

- Certain vaccinations are essential, and every foal should receive them
- Risk-based vaccines may be advised under the guidance of your veterinarian
- First vaccinations should be given at about 4 to 6 months of age to prime the immune system
- A series of boosters will be needed over the course of the ensuing six months to ensure optimal protection and a strong immunological foundation
- Work with your veterinarian to customize a vaccination schedule that considers
  - region of the country
  - endemic diseases on the farm
  - risk of disease exposure.

The American Association of Equine Practitioners (AAEP) vaccination guidelines for foals offer a great explanation of vaccination recommendations tailored just for the horse under 1 year of age. ***Please consult with your veterinarian on all vaccination programs.***

Click to download

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. Technical veterinary advice, interpretation and case management support will be provided by Merck Equine Veterinary Professional Services and Nicola Pusterla, DVM, PhD, DACVIM, AVDC-Equine, Department of Medicine and Epidemiology, UC Davis.

If you have questions about the program or **to request past issues of the newsletter,** please call our team at (866) 349-3497, or email us at the addresses listed below.

Dr. D. Craig Barnett
craig.barnett@merck.com

Dr. Fairfield Bain
fairfield.bain@merck.com

Dr. Wendy Vaala
wendy.vaala@merck.com

Dr. Duane Chappell
duane.chappell@merck.com

Dr. Earl Gaughan
earl.gaughan@merck.com

Dr. Chrissie Schneider
chrissie.schneider@merck.com

Dr. Bryant Craig
bryant.craig@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) "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.

2) "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., Pusteria, *N. ACVIM* 2017 Abstract.

3) "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.

4) "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

5) "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.

6) "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 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 10,000 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: 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 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.

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