INFO SHEET
Veterinary Services
APHIS
United States Department of Agriculture
Animal and Plant Health Inspection Service
October 2001

Infectious Upper Respiratory Disease in U.S. Horses: Laboratory Results for Influenza Serology and Nasal Swab Culture for *Streptococcus* Isolation

Equine infectious upper respiratory disease (IURD) is a problem that affects horses worldwide. Infected horses often develop a fever, cough, and nasal discharge. They also may develop swollen lymph nodes, lethargy, and decreased appetite. Usually, horses recover from IURD without suffering long-term complications.

Equine influenza virus is one of the most common causes of IURD. Horses can develop antibodies to influenza virus following vaccination or after infection with the virus. Horses with high levels of these antibodies are less likely to become ill following exposure to equine influenza virus.

Bacterial infections also can cause respiratory disease in horses. Strangles is among the most serious types of these bacterial infections and is caused by *Streptococcus equi* subspecies *equi*. Often, horses with strangles develop swollen lymph nodes of the head and neck. These infected lymph nodes may rupture and drain pus.

The bacteria *Streptococcus equi*, subspecies *zooepidemicus* and *Streptococcus dysgalactia*, subspecies *equisimilis*, also can infect horses. While these bacteria may cause clinical respiratory disease in horses, not all exposed horses become ill. Horses carrying these bacteria can be a source of infection for other horses, even if they are not displaying clinical signs of disease.

The National Animal Health Monitoring System (NAHMS) collected data on equine health and management practices from a representative sample of equine operations in 28 states from 4 regions[1]. For this study, horses were defined as full-size breeds, usually standing at least 14 hands tall (56 inches) at the withers when mature. Horses were considered residents of an operation if they spent more time at that operation than at any other facility during the study period. Operations that completed the questionnaire phase of the study were asked to participate in the collection of biologic samples.

Blood samples from horses were obtained to determine antibody titers to equine influenza virus by using hemagglutination inhibition (HI) testing. Swabs were used to collect nasal secretions from horses and then cultured to identify *Streptococcus* bacteria. Testing was performed by the National Veterinary Services Laboratories. The number of horses tested was based on the horse inventory on the operation. Blood was collected from up to 20 horses per operation, and up to 10 of these were selected randomly for nasal swabbing. Horses were sampled during the regular site visit; they may not have shown clinical signs of IURD.

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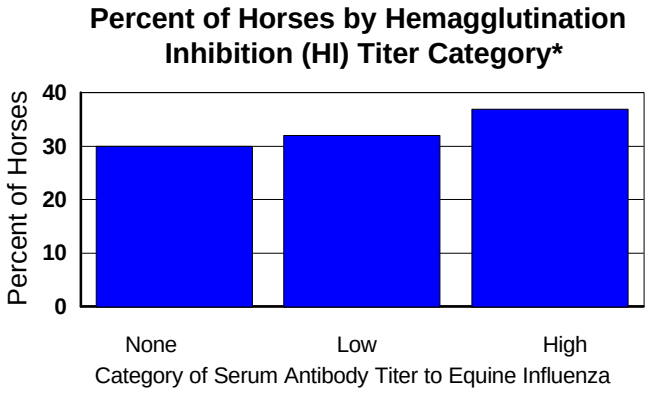
[1] **Western Region:** California, Colorado, Montana, New Mexico, Oregon, Washington, Wyoming.
Northeast Region: New Jersey, New York, Ohio, Pennsylvania.
Southern Region: Alabama, Florida, Georgia, Kentucky, Louisiana, Maryland, Oklahoma, Tennessee, Texas, Virginia.
Central Region: Illinois, Indiana, Kansas, Michigan, Minnesota, Missouri, Wisconsin.

Overall, blood samples from 8,265 horses from 949 operations were tested, and nasal swabs from 5,976 horses from 850 operations were cultured for *Streptococcus* spp. Approximately half the samples were collected from June 15 to September 23, 1998, while the remaining samples were collected from October 2, 1998, to March 3, 1999. Horses stabled at racetracks were not included in this portion of the Equine '98 study.

More detailed information on the study design is available in the NAHMS Equine '98 *Part I: Baseline Reference of 1998 Equine Health and Management*.

It is believed horses that produce an increased concentration of serum antibodies against equine influenza virus have a decreased risk of disease during outbreaks. For this study, horses were considered to have high titers if the HI influenza antibody titer was greater than 1:40; low titers if it was 1:10 to 1:40; and undetectable titers if the antibody was less than 1:10. An estimated 69.7 percent [Standard Error (SE)=1.9] of all horses had a detectable antibody titer to equine influenza virus (Figure 1.). An estimated 91.4 percent (SE=2.3) of operations had at least 1 horse with a detectable titer.

Figure 1.



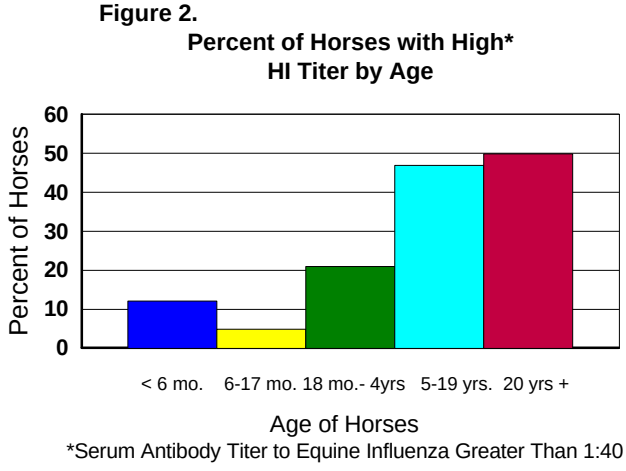
**None = <1:10 (no detectable titer); Low = 1:10 to 1:40; High = greater than 1:40*

There was no difference in the estimated percentage of horses with undetectable, low, or high titers and the region of the U.S. where they resided or the time of year the samples were collected.

Previous studies have found that young horses have the greatest risk of disease from equine influenza virus infections. In this study the age category of the horses was associated with the likelihood that they would have a **detectable** equine influenza virus antibody titer. Only 20.2 percent (SE=5.9) of the young horses aged 6 to 17 months had a detectable influenza antibody titer, as compared to 89.0 percent (SE=3.5) of horses aged 20 years or more.

The percentage of horses that had a **high** equine influenza antibody titer increased as the horse's age increased (Figure 2). However, even in older horses, 49.9 percent (SE=4.7) had low or undetectable titers. In this study, 95.1 percent (SE=2.1) of horses less than 18 months of age had low or undetectable titers. Young horses may have had low antibody concentrations because they either received fewer vaccinations for equine influenza virus than adult horses, produced less antibody following vaccination, or were less likely to be naturally exposed to the virus previously.

Figure 2.



**Serum Antibody Titer to Equine Influenza Greater Than 1:40*

The estimated percentage of horses with a detectable titer to equine influenza virus, and the percentage with a high titer, increased as the size of the operation increased. On operations with at least 20 resident horses, 81.5 percent (SE=2.7) of horses had

a detectable equine influenza virus antibody titer and 52.6 percent (SE=3.9) had a high equine influenza virus antibody titer. The percentage of horses on small operations (1 to 6 horses) with a detectable equine influenza virus antibody concentration was 63.1 percent (SE=3.9), while 30.6 percent (SE=3.5) had high titers.

A larger percentage of horses on large operations may have had higher equine influenza virus antibody titers because they had a greater chance of exposure to the virus from other horses on the operation. However, the difference may have resulted from other factors, such as management practices, vaccine strategies, frequency of contact with horses from other operations, and the age distribution of resident horses.

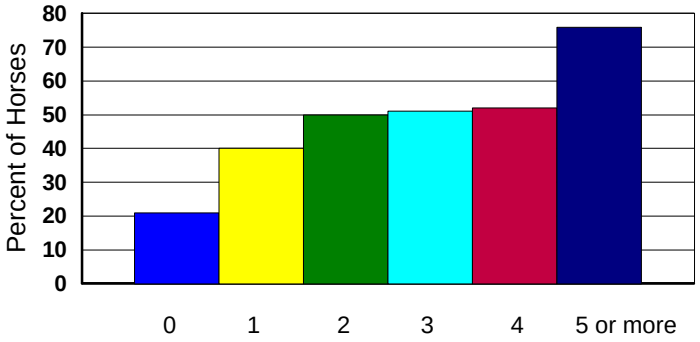
An estimated 1.3 percent (SE=0.4) of horses sampled exhibited signs of acute IURD during the 30 days prior to sampling. When comparing these horses to horses with no signs of IURD in the previous 30 days, there was no difference in the percentage of horses with a detectable equine influenza virus antibody titer or the level of the titer. This suggests that the IURD reported during the last month was not necessarily caused by equine influenza virus. Direct physical contact with horses from outside the operation in the month prior to sampling also had no apparent effect on the percentage of horses with detectable equine influenza virus antibody titers or the level of titer.

Horses in the U.S. are vaccinated routinely against equine influenza virus. An estimated 65.4 percent (SE=3.0) of horses in the study were reported to have been vaccinated previously. Horses in the study vaccinated for equine influenza virus were more likely to have a detectable equine influenza antibody titer than horses that had never been vaccinated. An estimated 76.7 percent (SE=2.0) of vaccinated horses had a detectable titer as compared to only 55.4 percent (SE=3.6) of those not vaccinated. Horses that were not vaccinated may have developed an antibody titer to equine influenza virus following natural infection.

As the number of times horses received an equine influenza vaccine during the previous year increased, the percentage of horses with a detectable titer and high equine influenza virus antibody titers also increased (Figure 3). Note that this study was conducted before intranasal influenza vaccine became commercially available in the U.S.

Figure 3.

Percent of Horses with High* HI Titer by Number of Vaccinations in Previous 12 Months



*Serum Antibody Titer to Equine Influenza Greater Than 1:40

Streptococcus equi subspecies *equi*, the bacterium that causes strangles, was isolated from only 3 horses, although nasal swab samples were cultured from almost 6,000 horses. *Streptococcus equi* subspecies *zooepidemicus* was isolated from an estimated 9.2 percent (SE=1.3) of horses, and *Streptococcus dysgalactia* subspecies *equisimilis* was found in an estimated 5.2 percent (SE=1.0).

Although approximately 70 percent of horses in this study had a detectable antibody titer to equine influenza virus, the majority of horses had low antibody titers. Horses vaccinated for equine influenza virus were more likely to have detectable antibodies, but vaccinated horses did not always have high antibody titers. Beyond vaccinating at-risk horses, horse owners and trainers should utilize management practices that minimize the risk of their horses contracting equine influenza virus, especially when dealing with young horses.

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