

# Control of EIA Should Take New Directions

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February 27 2007, Article # 8787

TheHorse.com

Horse owners in the United States pay over \$50 million each year to test for equine infectious anemia (EIA). What return are they getting for their money? How concerned should they be about EIA? This article attempts to put EIA in a contemporary perspective and offers suggestions for an improved benefit/cost ratio for continued and improved/expanded surveillance testing. Our message essentially paraphrases a homily as follows: "It is better to have tested and found a positive than never to have tested at all." In our opinion, if any stigma is associated with EIA, it should be applied to owners of untested horses, not those who own test-positive ones that are safely quarantined 200 yards from other equids.

## EIA as an Infection/Disease

Equine infectious anemia (EIA) is also known as "swamp fever." The name invokes fear in many, especially those who have never experienced the disease, but who have grown up with horses. The disease is caused by the equine lentivirus known as equine infectious anemia virus (EIAV). It causes a persistent, incurable infection in equid hosts and is diagnosed by presence of antibodies against the virus in the Coggins test and approved ELISA test formats.

Testing for EIA and removal of EIAV carriers since 1972 has reduced the chance of encountering infected horses. In 2006, according to statistics compiled by the USDA, in the United States nearly two million samples were tested and less than 200 test-positive horses were reported (<0.01%).

This article is written to put EIA in perspective and to discuss options/give suggestions for modifying our approach to control of this infection/disease, especially in the Western States where EIA is rare and where routine testing for EIA occurs at lower rates.

The authors represent 33 years of research on EIA (Issel), and over 40 years of collective practical experience and wisdom gained through veterinary practice and as state/federal animal disease regulatory officials (Halstead-Michigan and Cordes-USDA).

Readers are referred to the USDA Web site where more detailed information can be found in downloadable brochures and control guides (published as "Uniform Methods and Rules") and video order forms: <http://www.aphis.usda.gov/vs/nahss/equine>. A new DVD video on EIA is being produced by USDA for release in 2007.

## The Threat

With the advent of the Coggins test in 1972, we were for the first time able to diagnose EIA accurately. Initially EIA was diagnosed at high rates on farms and facilities where clinical cases had been suspected before Coggins testing was available. Once the initial waves of testing subsided, the majority of new cases found were without overt clinical signs of disease: no episodes of fever, anemia, depressed attitude, dramatic weight loss, dependent edema, or decreased platelet counts, often leading to death, typical of the "swamper" with the chronic form of the disease.

Since 1980, the vast majority of new cases reported in the US have been inapparent carriers. Probably two major factors led to this change: selection against the virulent strains of EIAV by removal, usually destruction, of the diseased horse, and reduction in the transmission of EIAV by people who had indiscriminately used contaminated needles and syringes.

### **Test-Positive Equids**

Because the EIAV mutates at a high rate and virus levels in the blood of infected horses change through time, the risk of transmission from any one EIAV-infected horse cannot be predicted with accuracy, either by direct observation or with highly accurate laboratory tests. This is especially true if you are trying to predict the future. Because of the aforementioned and the fact that all infected horses remain infected for life, disease control officials assume that all EIAV-infected equids pose the same high risk for transmission, regardless of their clinical status or history.

The high potential for transmission is often realized when the inapparent carrier horse is chemically immunosuppressed (dexamethasone treatment) or physically stressed. Horses that have been clinically quiescent for years can be provoked by such treatments to release immune control on virus replication. The result is a dramatically higher level of EIAV in the circulation (often 100,000 fold higher within days of such treatment). These spikes in virus release might be accompanied by acute clinical signs of disease, especially fever, which might be of short duration and missed without daily temperature recordings.

In the absence of man, transmission of EIAV is via mechanical transfer of blood between horses by contaminated mouthparts of blood-feeding insects that have been interrupted in their feeding on an infected host. In contrast to West Nile virus, EIAV does not replicate in the vectors. Horse flies and deer flies are the most efficient vectors, and the chance that they will transfer the infection is directly related to the level of virus in the blood.

During the inapparent stage of infection, virus levels are generally low and the chance of transmission is lower than during periods of disease. When a horse is immunosuppressed, EIAV is found in dramatically higher levels.

During acute signs of EIA, a single horse fly has been shown to transmit the infection from the horse with fever to a susceptible one. Although the process is not very efficient, horses rarely encounter individual blood-feeding vectors. When horses encounter thousands of vectors daily, the risk increases proportionally.

## **Management**

Control efforts have included segregation of test-positive horses (a distance of 200 yards is considered adequate to break transmission by blood-feeding insects) and recommendations to humanely destroy the animals. Often, owners of test-positive equids do not have the physical facilities to safely segregate the individuals and meet requirements imposed by animal disease regulatory bodies in their states.

Field studies have demonstrated a spectrum of results when test-positive equids are segregated. In some cases when test-positive equids are gathered without knowledge of their past history, clinical signs of EIA are seen within months and morbidity and/or mortality prompts the recommendation to destroy the EIAV carriers. In other cases, groups of inapparent carriers have been kept for years without presentation of clinical signs of EIA and with normal expected reproductive and athletic performance, in most cases limited because of the conditions of quarantine.

Thus, with proper management and strict adherence to maintaining a 200-yard separation from other equids, some test-positive equids can have long, productive lives, if given the chance. Most owners, however, do not have the physical facilities, patience, and dedication needed to establish and maintain such quarantine sites, and many state regulations do not currently permit them.

An exception is a quarantine site permitted under rules in the state of Florida: The FRIENDS Ranch. This not-for-profit group was established initially under a different name in the 1970s and has grown to the point where, at last count, 45 test-positive horses are maintained, adopted, and sponsored by individuals. The horses are used on the quarantine site for recreation and in limited in-house competitions/events. As of January 2007, they had an additional 15 test-negative horses on the site, and none of them have acquired the infection. One such horse (One-eyed Red) was in contact with the positive band for more than 10 years and died as an aged test-negative horse. (The FRIENDS Ranch website is: <http://www.eiahorses.org>.)

EIA is one of easiest infectious diseases of horses to control. Test for antibodies, segregate those that are positive and the problem is solved, especially if you retest contacts after 60 days to cover the expected incubation time (from exposure to first positive antibody test.) Control is simplified because the only known reservoirs of the infection are persistently infected equids, and all infected equids develop antibody against the virus that we can detect with accuracy in serologic tests, the AGID (or Coggins) test, and ELISA tests.

We have the tools to eradicate EIA in the United States. All that would be needed is to test every equid today, segregate the positives, then quarantine and retest all equids exposed to the positives (within the previous 60 days) 60 days later. Continue until all exposed equids prove test-negative. While this is not practical on the national scale, this same approach can be used to render stables, communities, regions, et al., free of the infection.

## **The Quandary**

Taken together, the risks posed by the test-positive horse can be effectively managed by maintaining spatial barriers (≥200 yards). In spite of this, most agencies recommend destruction of the test-positive horse, in part because many owners who have the option and decide to keep the EIAV carrier receive negative feedback from other owners for keeping the "Swamper" and follow recommendations to euthanize within a few years anyway.

We have put that into words as: the psychological risk of keeping the EIAV-infected carrier far exceeds the biological risk. In fact, a quantitative risk assessment comparing untested and safely quarantined horses tells us that the risk of acquiring EIA from an untested horse in the United States today is about 100,000,000 times greater than from a quarantined test-positive EIAV carrier 200 yards away.

It is our hope that increased knowledge will help horse owners understand the manageable risks associated with EIA, and encourage additional testing to define the remaining reservoirs of infection. Once identified, they can be safely managed.

Today, surveillance testing of apparently normal horses could result in a positive test that can be fatal for a lack of practical options. For some owners this is sufficient justification not to test. If owners are serious about control of EIA, states/regions might need to provide viable options for safe management of test-positive EIAV carriers, especially if it would lead to better identification of untested reservoir populations.

### **Need for Accurate Numbers**

We estimate that owners have paid in excess of \$600 million since 1980 to test for EIA. The number of test-positive equids reported annually by the states to the USDA has been on a gradual downward trend since 1980, when there were 4,635 positive horses identified. In subsequent years the numbers of positive horses dropped to a low of 188 in 2006.

For comparison, from 1974 to 1976, over 10,000 positives were reported each year. Since testing statistics were first compiled, over 100,000 positives have been reported in the United States.

Although the numbers give trends from which useful data can be gleaned, they do not represent accurate rates of infection expected in the general population. The results are biased toward negative because the same negative horses are tested each year, often required for entry to competitions, to cross state lines, etc. It is not surprising then that many of the new cases of EIA are found on individual premises where testing has not previously occurred. Such previously untested reservoirs represent a major challenge that must be addressed in future EIA control strategies. For example, from 2003-2004, all cases reported from Nevada were on one ranch. Such anomalies of distribution have been reported each year and explain unexpected increases in reported numbers.

From the above data, various stories could be told, but their accuracy would be questioned because the samples are not representative of the population at risk. For example, in Nevada in 2003, 0.18% of reported samples were positive, a misleading estimate of the expected infection

rate in the state. If the positive cases on the one ranch are deducted, not one of the samples from Nevada was positive.

The point is this: statistics can be misleading, especially if they are based on inaccurate data collection. When accurate numbers for the population at risk are known and when testing is performed using an unbiased scientific method of sampling, then reliable data are generated and we can speak with authority and precision. This point is discussed further below.

### **Costs for Testing**

From a distance, the testing statistics look compelling. Numbers of test-positive horses have decreased from 10,000 per year to less than 200 per year, while the number of horses tested has nearly quadrupled. The rate of positives has gone from 1.7% in 1975 to 0.01% in 2006, more than a hundred-fold reduction. The risk of encountering an EIAV-infected equid in the mobile and tested horse population is virtually zero today. We have attained this position at great expense to individual horse owners. Today it could be argued that testing the same negative horses each year does not protect our horses against EIA, does not effectively address the untested reservoir of EIA, and is greatly in excess of the risk.

This is probably best exemplified by reviewing reported testing data from 11 states in the Northeast (ME, NH, VT, MA, RI, CT, NY, PA, NJ, DE, MD). We have estimated that owners there have paid almost \$1.5 million to find each test-positive equid over the last six years (from 2001-2006, 1,365,932 samples were tested at about \$25 each to find 23 new cases).

In 2006, if the 66 cases found on a single premises in Minnesota and the 20 on one other premises in Mississippi are subtracted from the statistics, over \$50,000,000 was paid by owners to find 101 new cases of EIA in the United States, nearly \$500,000 to find each new positive horse.

### **Can We Do Better?**

We can, and we must, if we wish to maintain the confidence of owners. In 2004, the U.S. Animal Health Association passed resolutions forwarded from the Infectious Diseases of Horses Committee that urge the creation of formal Cooperative Programs between states and regions with the USDA for development of more effective programs to protect equids against EIA. For example, if the states in the Northeast region changed their testing requirements from 12 months to 36 months and waived additional testing for movement between those 11 states, testing costs would drop substantially at no additional risk for EIA. If at the same time a negative test was required for each change of ownership, the public would be protected better than they are today and at lower costs.

### **New Positives: Where and Why?**

Analyses of testing results from each state until now have not been published. If we knew where and how most new cases of EIA have been found, that knowledge could be used to improve the benefit/cost ratio. Several years ago, Dr. Bob Harbison was monitoring testing statistics in

Arkansas after an annual test and a "change of ownership" test were required. His analysis, which has not been published, suggested that the majority of new cases were found when previously untested horses were sold. Similar results were seen in Texas when their change of ownership requirement was adopted.

Year after year, such new foci of infection are discovered throughout the United States. A thorough analysis of testing and epidemiologic data should be performed by state and by region across the United States to generate sound data that could be applied to improve future control efforts.

### **New National Thrusts**

In 2004, the USDA was requested to begin development of a National Cooperative Control Program for EIA that is to be based on addressing the professed needs of states and regions. As alluded to above, if state and regional animal disease regulators found that horse owners in their area widely supported reduced testing and that analysis indicated that such a change would not increase the risk of EIA, then the USDA is empowered to help establish and monitor such a plan with the hope of additional financial support for other perceived needs for the control of EIA in the area. It is our intention to assist the educational and other support needs for this program development.

The entire control program for EIA is based on accuracy of test results. Today, in addition to the Coggins test we have approved ELISA laboratory tests for EIA that are less subjective and whose results are less dependent on interpretation than in the Coggins test. By combining the powers of the ELISA tests and the Coggins test, more accurate results are possible. Because of this, the state of Oklahoma requires that all private laboratories that test horses in Oklahoma for EIA use ELISA tests, and forward any positive samples to the state laboratory where confirmation testing using ELISA and Coggins tests are performed. By adopting this strategy (originally proposed as a national three-tier laboratory system), Oklahoma feels they are more accurately reporting the status of the horses tested.

Our goal is to continually review and capitalize on the strengths and advantages of the approved diagnostic tests for EIA for most accurate test results possible, improving on the excellent results provided by the Coggins test over the last 35 years.

### **Regional Arrangements**

Until now, each state has controlled EIA according to its own priorities. Few interstate agreements have existed. One, between Oregon and Washington, permits the movement of equids between them without having to meet the EIA import testing requirements imposed on equids moving from other states. In other words, these state disease regulators assume that the risk of EIA in both states is equivalent and in-state requirements should be applied to equids in both states. In order to accurately estimate the risk of EIA needed to develop such agreements, most states would require statistical analyses to establish accurate estimates of the expected rate of EIA in their state and surrounding states. Once such estimates are available, we think owners of horses would choose local, state, and regional programs that are effective in reducing the risk

of EIA and that are cost-effective. There would be tremendous cost savings to owners if regional control programs for EIA were adopted. When coupled with adjustment of testing intervals (generally reduction to every two to three years depending on accurate risk estimates), savings to owners annually could easily exceed \$25 million!

### **National Control Program**

Scientists and disease regulators are convinced that effective control of EIA must utilize the most accurate techniques for the diagnosis of the infection in practical and cost-effective strategies supported by owners of equids in their regions.

Thus, in areas where the risk of EIA is low and where a high percentage of horses have been tested, analysis of data might support regional programs that would reduce routine testing and increase the level of testing at those points considered at highest risk, e.g., at change of ownership. Once agreements are made, funds from the USDA could help initiate, monitor, and sustain such efforts.

In areas where testing is not required except for entry into the state, owners and regulators might decide that testing should be recommended/required for all changes of ownership. If analyses indicate that this is a high-risk point, funds might be applied to help sponsor such testing.

The only federal EIA regulation today applies to movement of test-positive equids across state lines, where both federal and state permits are required. The request to the USDA to establish the cooperative control program indicates that no additional national requirements will be added. States and regions could agree to area-wide requirements and the USDA could help enforce them, but USDA would only add requirements if uniform nation-wide support for such new rules existed.

### **Action Plan Needed**

When presented with the facts, regulators of animal diseases are placed in a difficult position. They realize that 35 years of testing has placed our equine industry in an enviable position--the risk of acquiring EIA in the United States today is nearly zero. As a result, regulators are cautious about adopting "relaxed" rules concerning EIA without demonstrated support from owners, even if the changes are expected to save dollars and lead to improvements that lead to finding the sources for continued transmission of EIA.

Stated another way, there is a tremendous opportunity for owners to have their voices heard and make changes in the control of EIA in their areas. Once cooperative agreements are made, region-wide programs might lead to more effective control of EIA at lower cost to owners, which we think is long overdue.

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