EQUINE DISEASE QUARTERLY

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COMMENTARY

IN THIS ISSUE

Preventing infectious diseases has often been perceived by horse owners as "which vaccines do I need this year?" While vaccines are an important part of an annual health care program, controlling and preventing diseases through management and disinfection has only come to the forefront in the past 20 years.

Veterinary and university hospitals, because they house sick animals along with healthy ones awaiting routine surgeries, have been at the forefront of what is now routinely known as biosecurity. Large hospitals now often have an individual solely dedicated to infectious disease control.

The recent recognition of an equine herpesvirus variant causing neurologic disease and several large outbreaks spanning multiple states has horse owners really understanding the critical importance of biosecurity. The threat of "was my horse exposed" looms when a herpesvirus infected horse has been confirmed at a racetrack, horse event, or horse farm. Unfortunately, it sometimes takes a potentially deadly disease to get people's attention.

So, as we approach the spring and summer with hours of riding and horse enjoyment, people need to be cognizant about not sharing equipment with others without disinfecting afterward; of washing their hands after handling other horses; of avoiding nose-to-nose contact of their horses with others; quarantining horses when they return to the farm; and other recommendations from the Lloyd's Equine Disease Quarterly of July 2011. They do make a difference! As always, consult a veterinarian about an appropriate vaccination program and biosecurity recommendations for your particular circumstances.

Managers of equine event facilities also have a part to play. Financially, they want events to proceed without major disease interruptions and potential quarantines for the sake of the horses, the owners and basic economics. However, how many stalls at busy facilities are completely cleaned and disinfected before the next round of horses arrives? The horse owners need to take personal responsibility to inspect their assigned stalls (yes, even when arriving at 2 a.m.), and clean them if necessary. Use your own equipment, including buckets, lead ropes, cross ties, hay nets, pitchforks, etc.

Biosecurity and disease awareness also emphasizes the important function of the International Collating Report on Page 2 in virtually every edition of the *Lloyd's Equine Disease Quarterly*. Knowing when outbreaks of diseases occur in your own country, as well as others gives an idea of what illnesses are circulating. It also emphasizes how diseases can travel with horses internationally.

One reader emailed the question of why accurate numbers of strangles cases were not available for the USA in the International Collating Report. Not all equine diseases are reportable to state veterinarians or centrally located collating centers for equine disease reporting. Internationally, equine disease reporting varies from country to country, and can be a daunting task with current limited resources. However, the expansion of countries providing detailed reports received at the International Collating Center has significantly grown in the past 20 years and has made the Report a valuable resource.

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LLOYD'S

INTERNATIONAL

Fourth Quarter Report 2012*

The International Collating Centre Newmarket, United Kingdom, and other sources reported the following disease outbreaks.

One report of contagious equine metritis was received from the United Arab Emirates (UAE). The causal agent, *Taylorella equigenitalis*, was detected in two stallions, one of which had been used for breeding in Germany the previous year.

In a national survey in Italy, 47 of 34,464 blood samples were positive for antibodies to *Trypanosoma equiperdum*, the cause of dourine with no reports of associated clinical disease.

Strangles was reported in Ireland (nine cases), Sweden (four outbreaks), Switzerland (one case), and the USA.

Equine influenza was reported from France, Germany (one case), the UK (three outbreaks), and the USA. France recorded the disease on three premises involving 10 Connemara ponies, two of which died. The three outbreaks were epidemiologically linked to ponies purchased in Ireland.

Equine herpesvirus-1 related diseases were reported by France, Germany, Japan, the UK and the USA. Three outbreaks of EHV-1 respiratory disease were confirmed in France, with three premises and eight horses involved. The USA reported numerous cases/outbreaks of the disease in several states.

Abortion due to EHV-1 was recorded in France (two cases), Germany (single case), Japan (single case), and the USA (two cases). EHV-1 myeloencephalopathy was reported in France, the UK, and the USA. France reported six cases. Two outbreaks were recorded in the USA, at an Illinois racetrack and a Minnesota horse farm. Of six cases identified at the racetrack, five were euthanized and one recovered. Of seven horses on the premises in Minnesota, five became neurologic, one of which was euthanized. The UK reported one outbreak in a Thoroughbred training yard that involved four cases, one of which was euthanized.

Respiratory disease associated with EHV-4 infection was reported by France (13 outbreaks), Germany (two cases), Japan (13 cases), Sweden (seven cases), and the UK (one case). The UK reported one case of EHV-4 abortion.

Cases of infection with equine herpesvirus-2 and herpesvirus-5 were diagnosed in several states in the USA.

Equine infectious anemia was confirmed in Canada with 21 cases: in the Yukon (eight), Alberta (two), and Saskatchewan (11). Three positive cases were diagnosed in the UK on two premises with the source of infection believed to have been a shipment of horses from Belgium in 2008.

Equine piroplasmosis was recorded in France (endemic), Switzerland (one case), and the UAE (endemic).

One additional outbreak of vesicular stomatitis (New Jersey serotype) was diagnosed in the USA, bringing the 2012 total to 36.

Forty-two cases of Eastern equine encephalomyelitis were confirmed in the USA, bringing the annual total to 213. The highest numbers of cases were recorded in Louisiana, Mississippi, and Florida.West Nile encephalitis was reported by Italy and the USA. Thirty outbreaks were confirmed in Italy, with cases of clinical disease on 13 premises. Prevalence of clinical cases was 23 percent, with a case-fatality rate of 20 percent. The USA reported nine additional cases, bringing the annual case total to 654. Texas (117), Louisiana (62), Pennsylvania (50), California (46), and Oklahoma (42) had the highest numbers of cases. The disease was recorded in 42 states.

Five fatal cases of Hendra virus infection were diagnosed in Australia: three in the Rockhampton area and two in the Cairns area in Queensland.

Salmonellosis was diagnosed in Germany (three cases), Ireland (one case), and the USA (cases/outbreaks in several states).

Kentucky, USA, confirmed two cases of equine monocytic ehrlichiosis, and sporadic cases of enteritis due to *Clostridium perfringens* type A and *Lawsonia intracellularis*.

The USA also confirmed 15 cases of leptospiral abortion, outbreaks of *Corynebacterium* pseudotuberculosis in an increasing number of states, and outbreaks of *Rhodococcus equi* infection. Japan reported a case of tetanus, and Germany reported a case of rotaviral enteritis.

**Third Quarter Report for Australia*

Equine Disease Quarterly

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Changing Tides in Insulin Resistance Interpretation

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In 1999, I was told, "Everyone knows blood insulin and glucose are too variable to be of any use." However insulin resistance (IR) and Equine Metabolic Syndrome (EMS) have been the focus of much research for the past 10 years and blood insulin and glucose levels do have their purposes when appropriately used and interpreted.

A widespread perception exists that any elevation above "normal" in plasma insulin (hyperinsulinemia) indicates EMS and a significant risk of laminitis. However, diagnosis is not quite that simple.

There are indeed a number of factors that influence fasting glucose and insulin responses to dextrose or sugar challenges and tissue sensitivity to the actions of insulin. These need to be taken into consideration when evaluating an IR/EMS suspect. We now know that not all obese horses are IR, nor are truly IR horses/ponies/donkeys at high risk of laminitis always obese. Stress and acute pain can also induce IR.

Hyperinsulinemic responses to sugar challenges and mild fasting hyperinsulinemia are normal in horses adapted to high starch/sugar feeds. This is an adaptation that allows rapid return to normal blood glucose levels after ingestion of high glycemic index feeds and does not pose a health risk to the horse. The return to baseline insulin concentrations is actually faster than in horses not accustomed to ingestion of grain-based concentrates, so previous rations need to be taken into consideration.

Researchers use the modified Frequently Sampled Glucose/Insulin Tolerance (FSGIT) test as the gold standard for determining insulin sensitivity and detection of changes in experimental models. However, this test is impractical for field use. Low dose (0.25 gram dextrose/kg or 0.15 ml Karo Syrup/kg) sugar challenges are now recognized to be more reliable physiologic and sensitive measures of insulin sensitivity. The challenge is given orally in the morning and blood is drawn before dosing and then 60 and 120 minutes later. "Normal" peak glucose and insulin concentrations at 60 minutes are not well established but can be as high as 180mg glucose/dl and 60 µIU insulin/ml, respectively. At 120 minutes both should be lower but not necessarily returned to baseline levels. If there is hyperglycemia and hyperinsulinemia with a slow clearance, a horse may be at risk of IR/EMS and starch/sugar intakes may need to be restricted.

Much more research is needed into the physiology and epidemiology of these diseases.

EPM Diagnostics

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Antemortem (before death) diagnosis of equine protozoal myeloencephalitis (EPM) has been a long-standing source of frustration for equine veterinarians and horse owners. Typically, a diagnosis of EPM has been based on the presence of clinical signs consistent with neurologic disease along with a supportive serologic test demonstrating the presence of antibodies against the primary etiologic agent. Most often this is the protozoan parasite *Sarcocystis neurona*, although EPM is attributed infrequently to the related parasite *Neospora hughesi*.

Unfortunately, most any neurologic disease can cause clinical signs similar to those associated with EPM. Moreover, horses are frequently exposed to *S. neurona*, so simply the presence of antibodies in the blood has little diagnostic value. Given these challenges, it is little wonder that some veterinary practitioners have relied on "response to treatment" as a primary diagnostic criterion. This approach to EPM diagnosis is not only expensive; it can be misleading as well.

Thankfully, it is now possible to view EPM diagnosis with much greater confidence. The development of semi-quantitative assays that can measure antibodies against *S. neurona* allow for diagnostic methodology that identifies with high accuracy horses suffering from EPM. Specifically, the assays can be used to demonstrate *S. neurona*-specific intrathecal antibody production (i.e., antibodies produced in the central nervous

system), which indicates that there is active infection. This approach has been used for decades in human medicine and is based on comparing the amount of antigen-specific antibody present in the cerebrospinal fluid (CSF) relative to the blood. Infection in the central nervous system is confirmed when the amount of antibody present in the CSF is greater than anticipated from normal passive transfer across the blood-brain barrier.

A recent multi-investigator collaboration examined 128 horses that were diagnosed by postmortem examination with either EPM or another neurologic disorder (e.g., cervical-vertebral malformation). Serum and cerebrospinal fluid (CSF) from each horse were tested with two enzyme-linked immunosorbent assays (ELISAs) that detect antibodies against the conserved *S. neurona* proteins SnSAG2, SnSAG3, and SnSAG4. Three major conclusions were derived from the results of these analyses:

The ratio of antibody in serum vs. CSF provides an accurate diagnosis of EPM (about 92 percent sensitivity and 83 percent specificity).

Although less accurate for diagnosis, higher antibody titers in CSF were associated with EPM.

Serum antibody titers alone were not a good indicator of EPM.

Collectively, the findings from the study confirmed that intrathecal antibody production against *S. neurona* is a valuable criterion for EPM diagnosis, and they highlight the importance of performing spinal taps on suspected EPM cases to allow measurement of antibody in CSF.

The SnSAG2 and SnSAG4/3 ELISAs used for this study are capable of providing an accurate measurement of antibodies against *S. neurona*, which is critical for showing definitively that there are disproportionate amounts of antibody in the CSF. However, it should be noted that these ELISAs have no magical attributes that make the procedure exclusive to them. Consequently, it should be possible to obtain similar results using other reliable tests that can quantify anti-*S. neurona* antibodies (e.g., the immunofluorescent antibody test).

In summary, obtaining an accurate antemortem diagnosis of EPM is no longer an exercise in frustration. While it is still important to conduct a careful neurologic examination of a suspect EPM case, the ability to assess the *S. neurona* neuroinfection status using a supportive test has improved tremendously, thus leading to much greater confidence in a diagnosis. In turn, this leads to better and more timely care for horses suffering from neurologic disease.

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Rabies Cases During 2011

The National Center for Emerging and Zoonotic Infectious Disease at the Centers for Disease Control and Prevention published 2011 data on 6,037 cases of confirmed animal rabies in 49 states and Puerto Rico. Hawaii is a rabies-free state. Of these rabies cases, 92 percent were confirmed in wildlife and 8 percent in domestic species. These do not represent all rabies cases in the US since rabies cases, especially in wildlife, go unobserved and undetected.

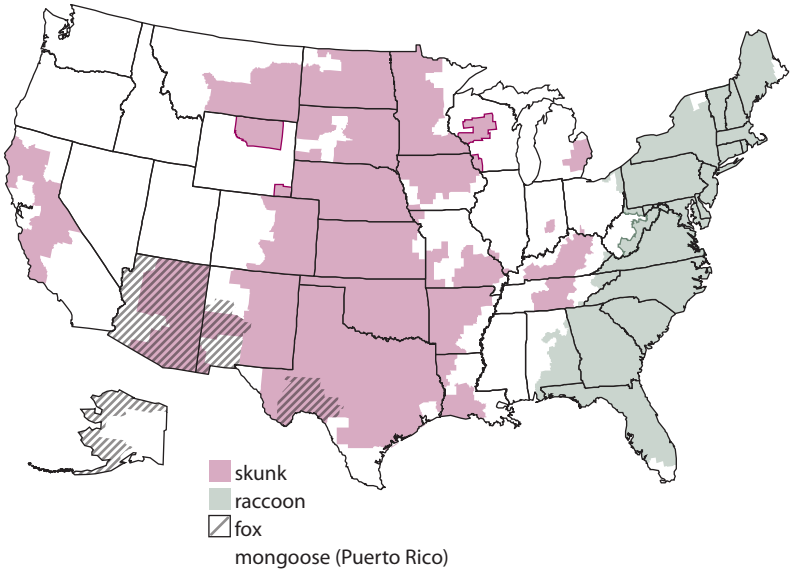

Figure 1. Distribution of Major Rabies Reservoirs in the United States and Puerto Rico, 2007-2011.

Adapted from JAVMA, Vol 241, No 6, p 712-722

Eleven states and Puerto Rico reported 44 rabid equids in 2011: Florida (1); Georgia (1); Kentucky (1); Maine (1); Nebraska (4); New Jersey (1); North Carolina (3); Oklahoma (1); Puerto Rico (4); South Dakota (1); Tennessee (2); Texas (22); and Virginia (2).

Canada reported two cases in equids. Mexico reported three rabid horses.

Rabies is a viral disease that is a reportable disease in the United States for humans and animals. In the continental US, the primary reservoirs of rabies virus are raccoons, skunks, foxes and bats (Figure 1). Historically, bat rabies has been confirmed in all 49 continental states. In Puerto Rico, the mongoose is the wildlife reservoir.

Blanton, JD, Dyer, J, McBrayer J, et al. (2012) Rabies Surveillance in the United States during 2011. J Am Vet Med Assoc 241:712-722.

KENTUCKY

Equine Neurologic Disease

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The necropsy records of the University of Kentucky Veterinary Diagnostic Laboratory (UKVDL) for the years 2011 and 2012 were searched for equine cases having a clinical diagnosis of neurologic disease. The search revealed 38 cases in 2011 and 50 cases in 2012. These represent 2.2 percent and 3.1 percent, respectively, of the total equine necropsy cases examined at the UKVDL during the last two years. Although the percentages are small, the accurate diagnosis of equine neurologic disease is important because these cases often result from infection with specific pathogens, some of which are communicable to other horses and may even pose a zoonotic risk to people.

The most common diagnosis by far was a non-infectious condition, cervical vertebral stenotic myelopathy, or wobbler syndrome. There were 42 total cases of stenotic myelopathy (21 each year). Thirty-six of the cases (86 percent) were in male horses and five (12 percent) were in female horses (in one case the gender was not recorded). The ages of the horses at time of necropsy were skewed to younger animals. Six were juvenile (less than 1 year old), 20 were yearlings, and 10 were two year olds. Four horses were three years or older (ranging from three to seven years of age). In keeping with the predominate breed in Central Kentucky, 18 of the cases were in Thoroughbreds; however, other breeds were also involved. Five of the cases were Quarter Horses, and there were individual cases in American Saddlebreds, Tennessee Walking Horses, and Standardbreds.

Wobbler syndrome is associated with abnormalities of the cervical vertebrae, which result in compression of the spinal cord in one or more areas leading to neurological signs. No predominant site of compression in the cases was recorded in this two-year period. Based on the findings at necropsy and microscopic examination of the spinal cord, 13 of the cases had compression at C 3-4 (the junction of the 3rd and 4th cervical vertebrae), 13 cases had compression at C 4-5, 11 cases at C 5-6, and 12 cases at C 6-7.

The next most commonly diagnosed group of neurologic diseases was encephalomyelitis/myelitis cases. Equine protozoal myeloencephalitis (EPM) caused by *Sarcocystis neurona* was the principal disease that was diagnosed. Some 12 cases occurred in 2011 and 18 in 2012. Most involved adult horses ranging in age from a juvenile to a 20-year-old mare. Six yearling horses and several different breeds were represented. The causative agent was visualized in tissue in a small percentage of the cases, while diagnosis in the majority was based on the characteristic microscopic pattern of inflammation and damage in the spinal cord and brain stem, which was typical of EPM. Many of the horses had received treatment for EPM and this likely contributed to the difficulty in demonstrating the agent.

Other causes of encephalitis/myelitis were West Nile Virus (four cases in 2012), one case of equine herpesvirus (EHV-1) myeloencephalopathy in 2011, and one encephalitis case of undetermined

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etiology in 2012. The WNV-associated disease was seen in three adult horses and one yearling. The diagnoses of WNV and EHV-1 were made on the basis of microscopic examination of the brain and spinal cord tissue and a positive polymerase chain reaction (PCR) test result.

Inflammation of the membranes covering the brain (meningitis) or the membranes plus the brain tissue (meningoencephalitis) were occasionally diagnosed in horses submitted to the UKVDL. There were five cases in 2011 and 10 cases in 2012. Eight were in adult horses, and seven were in foals. The majority were caused by bacteria with eight cases attributed to bacterial infection. Isolates included the genera of *Streptococcus*, *Staphylococcus*, *Salmonella*, *Klebsiella*, and *Actinobacillus*. Two cases involved fungal infection, and five were idiopathic cases (no known cause).

Encephalopathy was diagnosed in three cases in 2011 and six in 2012. Encephalopathy refers to neuronal dysfunction resulting from a variety of causes. Pathologically, there typically is neuronal degeneration with inflammation not being a component. In all cases the encephalopathy was believed to be secondary to another process. The cases included four adult horses, four foals, and one juvenile horse. The adult cases were all secondary to liver disease and were classified as hepatic encephalopathy. The cause in the foals was believed to be encephalopathy secondary to neuronal degeneration as the result of hypoxia at birth.

Over the two-year period, 46 horses were tested for rabies because of antemortem clinical signs but no cases of rabies were diagnosed. There were two cases of cauda equina neuritis (polyneuritis equi), in a yearling and an adult horse. This idiopathic condition results from inflammation of the peripheral nerve roots at the termination of the spinal cord.

In a prior issue of the EDQ (July 2003, Volume 12, Number 3) that reviewed cases over a three-year period, neurologic diseases (excluding trauma to the CNS) comprised 5 percent of the equine cases, which is slightly more but similar to the current report. As in 2003, when wobbler syndrome accounted for a third of the neurologic cases, it was also the most common diagnosis in the present group. EPM remains the most common infectious/inflammatory condition as was the case in 2003.