EQUINE DISEASE QUARTERLY

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COMMENTARY

IN THIS ISSUE

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LLOYD'S

"Climate is what we expect; weather is what we get."
— Mark Twain

YOU DO HAVE TO ADMIT THAT MOTHER Nature has been throwing us some curveballs lately.

For example, Arkansas, Missouri, and Illinois experienced tornadoes on New Year's Day. In areas of Southern California, over 12 inches of rain fell in 24 hours in December. Flooding of "biblical proportions" enveloped Queensland, Australia, in February, followed by a cyclone. Droughts have plagued many areas of Australia, while more sporadic droughts have caused billions of dollars of agricultural losses in the United States and other countries. The great blizzard of February 2011 enveloped 30 U.S. states in record snowfall, windchills, and hazardous weather conditions from Texas to Maine.

As a meteorologist in the UK Ag Weather Center, I wonder about these issues every day. The Kentucky weather pattern for this winter had nothing to do with climate change and has everything to do with climate anomalies, known as teleconnections. The La Niña that brought drought to Kentucky last summer and fall continued to gain strength this winter, resulting in cold and snowy weather through much of the Northern Hemisphere, including Kentucky.

Moderate to strong cold sea surface temperatures in the equatorial Pacific are impacting global weather patterns, including increasing the frequency of tropical storms in the Pacific and suppressing the number of tropical storms in the Atlantic.

For the Northern Hemisphere, the long-range outlook includes La Niña and its impact well into spring 2011. Likely La Niña's impact in the United States will include an enhanced chance of above-average precipitation in the Pacific Northwest, the Northern Rockies (including snowfall), the Great Lakes, and the Ohio Valley. Below-average precipitation is likely across the Southwest and Southeast. An increased chance of below-average temperatures is predicted for much of the West Coast and the northern tier of states (excluding New England); a higher possibility of above-average temperatures is forecast for much of the southern and central United States.

In the spring, the National Weather Service offers severe weather trainings in many parts of the United States. These trainings teach those enrolled how to recognize potentially dangerous storms. For horseback riders on the trail or at the horse show, being able to "read the sky" can be critical. Classes are free and approximately two hours long. Contact and schedule information is available at http://www.weather.gov/skywarn/index.shtml.

Additionally, every barn, home, and office should have a National Oceanic and Atmospheric Administration (NOAA) Weather Radio that broadcasts official National Weather Service warnings, watches, forecasts, and other information 24 hours a day, 7 days a week. These radios can be purchased at home improvement centers and most electronics stores. The $30 investment could save human and animal lives. For more information, go to http://www.noaa.gov/.

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INTERNATIONAL

Fourth Quarter 2010*

THE INTERNATIONAL COLLATING CENTER, Newmarket, United Kingdom, and other sources reported the following disease outbreaks.

Contagious equine metritis (CEM) was reported in Germany (two mares) and France (one case). No evidence of *T. equigenitalis* was found in 292 stallions (114 Quarter Horses) located in 28 states in the USA that were screened as part of a voluntary testing program by USDA Animal Plant Inspection Service Veterinary Services.

Isolated cases of equine herpesvirus-1 (EHV-1) related respiratory disease were diagnosed in Germany and Italy. Cases of EHV-1 abortion were confirmed in Argentina (two), Japan (five cases on four premises), South Africa (15 cases on five premises), France (one), Germany (one), UK (two), and the USA (six in Kentucky).

Two cases of EHV-1 related neurologic disease in trotters were diagnosed in France. An outbreak in the UK involved 10 of 40 horses in a livery stable; nine were successfully treated. France recorded outbreaks of EHV-1 respiratory and neurologic disease on three premises, characterized by fever, anorexia, coughing, and nasal discharge accompanied by neurologic signs of varying severity. An additional two cases were confirmed in foals; one died.

An extensive outbreak of EHV-4 associated respiratory disease was reported in 4- to 6-month-old foals in Argentina. Limited cases were also diagnosed in Switzerland (EHV-4 detected with EHV-5), the UK, and the USA.

Equine influenza was reported from France (two cases, two premises) and the UK (one case).

Strangles was reported from France (nine premises), Germany (two cases), Ireland (seven cases on four premises), Sweden (riding stables, one racing stable, and one stud farm), Switzerland (isolated cases), the UK (endemic, especially among non-Thoroughbreds), and the USA (limited cases in Kentucky and Florida). An extensive outbreak of strangles occurred in recently captured range horses in the U.S. Bureau of Land Management facility in Utah, and multiple isolations of *S. equi* and *S. zooepidemicus* were made from abscessed glands.

Equine infectious anemia was confirmed in Western Queensland, Australia (three cases); France (two cases, one that had been imported from Romania via Belgium); Germany (22 continuing outbreaks in four federal states); and Italy (15 outbreaks).

France, Spain, and the UAE report that equine piroplasmosis (EP) is endemic in their respective countries. Germany diagnosed one case of *Theileria equi* and two cases of *Babesia caballi* infections. The USA reported primarily *T. equi* infections as part of an extensive testing and follow-up investigation program resulting from the 2009 discovery of the disease on a ranch in Texas. Of 2,500 horses tested, 413 *T. equi* seropositive horses were all epidemiologically linked to the index premises. An additional 143 horses (the vast majority seropositive for *T. equi*) unrelated to the index premises in Texas have been identified in 16 states. Many of the positive horses are Quarter Horse racehorses with representation from other breeds, including Thoroughbreds. Several horses had been imported into the USA, many from known EP-endemic countries. Nine states currently require EP testing for horses competing in sanctioned horse racing events. Further epidemiological investigations and testing are continuing.

The UK reported two stallions persistently infected with equine arteritis virus (one was a recent import); both animals have been gelded.

The USA reported 36 cases of Eastern equine encephalomyelitis since late September. Of the 10 affected states, the highest number of cases were in New York and Michigan.

West Nile encephalitis was reported from Italy (14 outbreaks) and the USA (86 cases), where the majority of affected horses were unvaccinated.

Salmonellosis was diagnosed in Germany (three cases) and Ireland (two cases). One case of leptospiral infection (not abortion related) was reported in Kentucky, and a case of abortion associated with *Enterobacter agglomerans* was reported in Queensland, Australia.

Infection with *Lawsonia intracellularis* was confirmed in 18 foals in Kentucky and one in Indiana.

**Third Quarter Report for Australia*

Equine Disease Quarterly

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Search for the Cause of Equine Atypical Myopathy

EQUINE ATYPICAL MYOPATHY (EAM), A seasonal, pasture-associated muscle disorder of unknown etiology, presents a particular challenge to European veterinarians. The disease is characterized by a generalized complete degeneration of muscle fibers, which leads to sudden death due to collapse of the cardiorespiratory system in over 90% of the cases. The economic impact is often devastating.

Affected horses can either die peracutely or show profuse sweating, muscle fasciculations, weakness, pigmenturia, reluctance to move, recumbency, difficulty breathing, and death after 12-72 hours. Since the etiology is unknown, no effective prophylaxis exists, and affected horses can only be treated symptomatically.

Large outbreaks have been reported since the '80s in parts of Europe including the United Kingdom, France, Belgium, Germany, the Netherlands, Switzerland, Luxembourg, and Denmark. In 2010, 224 new cases were communicated to the Atypical Myopathy Alert Group managed by Dominique Votion at the University of Liège in Belgium.

A very similar, if not the same, disease has also been observed in the United States and termed seasonal pasture myopathy. From 1998 to 2005, 14 cases were described in Minnesota. White snakeroot toxicosis (*Ageratina* spp., formerly *Eupatorium* spp., a perennial herb) was ruled out as a potential cause since its toxin (tremetone) was not found in liver or urine samples of affected horses. Seasonal pasture myopathy is thought to be caused by the same etiological agent as EAM.

Environmental factors such as regular access to pasture and certain weather conditions seem to influence the incidence of the disease, which occurs seasonally, mostly in autumn with lesser peaks in springtime and sporadic cases in winter. Young horses kept full time at pasture without any food complementation are most frequently affected, highlighting the importance of contact with grass. Further risk factors are adjacent streams and trees; dead leaves and branches in the pastures; and wet, windy, unpleasantly chilly weather conditions (but not severe frost). Removing manure from pastures, providing clean drinking water and salt blocks, and bringing horses in from pasture during rough weather is advised.

Causes of EAM that have been discussed and investigated include ionophores, mycotoxins, and phytotoxins. Recently, the development of EAM was associated with ingestion of maple leaves (*Acer pseudoplantanus*) covered with European tar spot (*Rhytisma acerinum*). Stress and metabolic imbalances as endogenous factors might predispose horses to develop the disease.

Over the last decades, the incidence of EAM, however variable from year to year, has increased, and demand is growing for causative, effective treatment and prevention. Therefore, identification of the causative agent is of paramount importance. Consequently, our current research at the Equine Clinic and the Institute of Bacteriology of the Vetsuisse-Faculty of the University of Berne is focused on clostridial toxins, specifically the lethal toxin of *Clostridium sordellii*. This large clostridial cytoxin is able to induce severe muscular damage when injected intramuscularly into mice.

Initially, we detected *Clostridium sordellii* DNA in feces and intestinal contents of horses suffering from EAM but not in corresponding samples from healthy pasture mates. However, this finding was not reliably reproducible.

Subsequently, we found the ultrastructural damage of myofibers observed in muscle samples of affected horses by light and electron transmission microscopy to be very similar to *Clostridium sordellii* lethal toxin induced structural damage in the cytoskeleton of different cell lines.

Most importantly, we were recently able to show that the lethal toxin of *Clostridium sordellii* is present in skeletal muscles of horses with EAM. Myofibers of affected horses reacted not only with an antibody specific for the lethal toxin, which failed to bind to the myofibers of either healthy horses or those with other myopathies, but also with sera from other EAM-affected horses.

Hitherto, *C. sordellii*-derived lethal toxin has been shown to cause gas gangrene syndrome in cattle and sheep and toxic shock syndrome in humans. Its presence in the myofibers of horses suffering from EAM suggests that it may play a role as a trigger or even as the lethal factor in the etiology of this disease. Anecdotal evidence and our most recent serological data suggest that naturally EAM-affected horses neither mount a protective immune response nor show a substantial increase in anti-lethal toxin antibodies, respectively. Our findings may nonetheless suggest a rational approach for the development of a protective vaccine.

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NATIONAL

Rabies: Preventable but Still Invariably Fatal

THROUGHOUT THE AMERICAS, RABIES IS endemic in several insectivorous bat species. Rabies is also endemic in raccoons from southeastern Canada to the Gulf of Mexico and from the East Coast to Ohio and the Appalachian Mountains. Four rabies variants are found in striped skunks throughout the midwestern United States; the Flagstaff, Arizona area; and in mid-to-southern California. Rabies in foxes is endemic in Alaska and the southwestern United States and in mongooses in Puerto Rico. In each of these mammals, unique rabies viral variants are exquisitely adapted to and efficiently perpetuated animal-to-animal. These variants cause rabies in other mammals, but the probability of sustained transmission is lower than in the reservoir mammals. (Hawaii is the only rabies-free U.S. state or territory.)

An important consideration in evaluating risk based on recorded cases is the level of surveillance. If the index of suspicion and infrastructure support for animal management and testing is low, such that few or no domestic and wildlife species are tested, endemic cases may be present in a locality but not be reflected in numbers of positive cases. The definitive test for rabies requires post-mortem testing of the brain.

The risk of rabies exposure is higher in geographic localities where rabies is endemic in raccoons, skunks, foxes, or other terrestrial reservoirs. Rabies transmission can also occur from a rabid bat to a horse or secondarily from terrestrial carnivores infected with bat rabies. Fortunately, only about 50 rabid horses are diagnosed every year in the United States. However, even a single case can have significant public health ramifications, as has occurred at the Tennessee Walking Horse National Celebration and other public venues. These cases then trigger extensive investigations to identify potentially exposed humans and other animals.

In a retrospective analysis of horse cases, signs of furious rabies, including aggression, were present in 40%, general neurologic signs and ataxia in approximately 30%, and excessive salivation and prostration in approximately 25%. In contrast to other livestock, rabid horses were far more likely to expose humans by biting them.

All mammals are susceptible to rabies, and once an animal is sick with rabies, it is invariably fatal. However, rabies prevention is easy: vaccinate horses with a licensed product; reduce exposure of horses to skunks, raccoons, and bats in barns; and promptly clean and treat any wounds found on horses.

No matter what the vaccination status of a horse, if it is bitten by a wild animal, call a veterinarian promptly. The recommendation for an unvaccinated horse exposed to a rabid animal is euthanasia or a six-month quarantine. The majority of cases occur several weeks to months after an exposure. Longer incubation periods have occurred, however, hence the six-month quarantine, after which it is highly unlikely that the animal will develop rabies from the exposure.

If a rabies vaccinated horse is exposed, the site of exposure (i.e., wound) should be thoroughly cleansed, a booster vaccination administered, and a 45-day observation enacted as a precaution. Rabies in vaccinated animals is rare.

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Dealing with Ticks

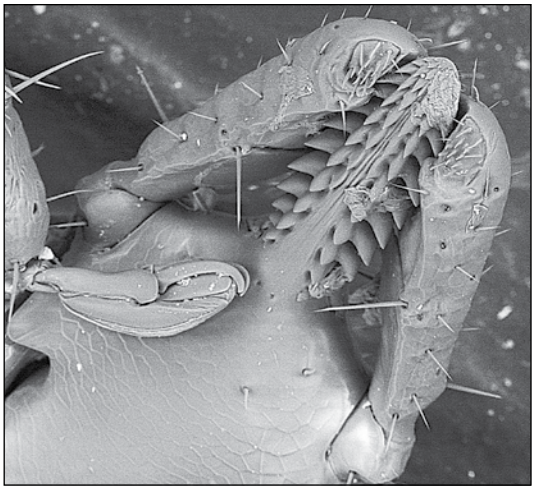
TICKS ARE NOT ONLY UNSIGHTLY, THEY can transmit diseases including ehrlichiosis, Lyme disease, and piroplasmosis. Severe infestations can cause skin irritations and even anemia.

Ticks spend most of their life on the ground in areas with some shade and humidity and congregate along trails, in overgrown areas, and in margins of wood openings. Direct sunlight and low humidity are their enemies. Keeping brush cut back and clipping pastures will make areas inhospitable for ticks and less attractive to deer and other mammals that may bring ticks into an area.

Repellents and insecticides containing permethrin or cypermethrin will provide several hours of protection for horses. These insecticides are very irritating to ticks, so they tend to drop off before attaching to the horse. Products based on natural ingredients, such as botanical oils, may give some protection for short periods of time.

Thoroughly check horses for ticks (especially on the lower legs and mane). Relatively large American dog ticks are easy to find, but small ticks can be easily overlooked. A final insecticide/repellant application before turning out the horse will help to dislodge any missed ticks.

Ticks wander on animals for some time before they settle and begin to feed. Barbed mouthparts, along with cement secreted by the tick, allow it to be



Scanning electron microscopy of tick mouthparts. Used with permission of Tor Svendsen Bjørheim and Anders Werner Bredvei Skilbred, University of Oslo, Norway.

firmly attached to the skin. Removing a tick requires a firm but steady pull. After donning latex or nitrile gloves, grasp the tick very closely to the skin and apply steady traction. While patience is required, this method is the one most likely to remove the entire tick from the skin.

Once attached, ticks cannot just decide to "let go," even if encouraged with a hot match tip, fingernail polish, or other home remedy. There is no substitute for pulling.

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KENTUCKY

Leptospiral Abortion: An Update

INFECTION OF THE PREGNANT MARE BY pathogenic leptospires can result in abortion, stillbirth, or birth of a weak foal. Yearly assessment of leptospiral abortions is important, as the incidence of disease can vary based on fluctuating environmental factors and population densities. This report provides a brief update of leptospiral abortions diagnosed during the 2010 foaling season and the first half of the 2011 foaling season (July 1, 2010-February 1, 2011). For reporting purposes, a foaling season is 365 days after July 1. For example, the 2010 foaling season was July 1, 2009 - June 30, 2010.

Thirty-one cases of equine leptospiral abortion have been diagnosed at the University of Kentucky Veterinary Diagnostic Laboratory (UKVDL) since the last update in the October 2009 issue of the *Equine Disease Quarterly*. All 31 cases were diagnosed during the 2010 foaling season (Figure 1), and no cases had been diagnosed through February 1 of the 2011 foaling season. Newly reported abortions occurred from September 2009 to March 2010, and affected fetuses ranged from 5 to 10.5 months of gestation. The abortions were primarily sporadic, as a single abortion was diagnosed on 20 farms, four farms had two abortions, and three leptospiral abortions occurred on one farm.

Identification of an infected mare is challenging, because most do not exhibit premonitory signs prior to abortion. Novel molecular assays, such as polymerase chain reaction (PCR), have aided in the diagnosis of leptospirosis. PCR analysis can identify the acute blood phase of infection (leptospiremia) and chronic renal infection of horses that shed leptospires in their urine. Mares that have PCR-positive urine samples should be appropriately managed to reduce exposure of this zoonotic pathogen to people, pregnant mares, and the environment.

The UKVDL offers a PCR for the identification of pathogenic *Leptospira* sp. in urine and tissue samples.

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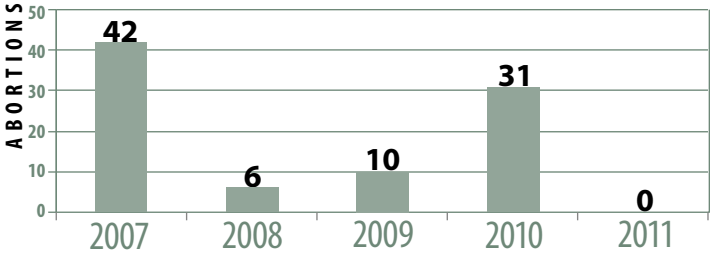
FIGURE 1. **Leptospiral Abortions by Foaling Season** (2007 - current)



Kentucky's 2010 EIA Surveillance and Testing: A Successful Model of Disease Surveillance

DURING THE 2010 CALENDAR YEAR, 95,384 serum samples were tested for Equine Infectious Anemia (EIA) in Kentucky, with no positive animals being discovered. Of these, 84,111 samples were collected and tested to comply with state regulations governing the sale and exhibition of equine in Kentucky or to meet interstate transportation requirements. In addition to these privately tested samples, another 11,273 samples were collected and tested as part of our market surveillance program. Horses sampled and tested in this surveillance model are regarded as having an elevated risk of exposure due in part to the environment from which many of them originate and the trading channels they may have passed through. During the 20-year period 1991-2010, 325,913 samples were collected and tested through the market surveillance program, with 108 horses (0.03%) found to be positive. In comparison, the private testing had greater than 1.9 million samples tested during this same time period, with 74 (0.004%) positive horses identified. Testing conducted during 2010 failed to identify positive equids in either of these populations.

As can be seen in the accompanying charts, the number of samples tested annually during the past 20 years is significant, and it provides data on two diverse classes of equids (Figures 2 and 3). The evidence supports the conclusion of a decreased prevalence of this virus within Kentucky's equine population. The model further demonstrates that prolonged, consistent, and accurate disease surveillance among identifiable populations can be beneficial in determining prevalence and progression of emerging equine disease in identified groups as well as aid in decision making.

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FIGURE 2. **EIA Market Surveillance 20-Year Testing Trend**

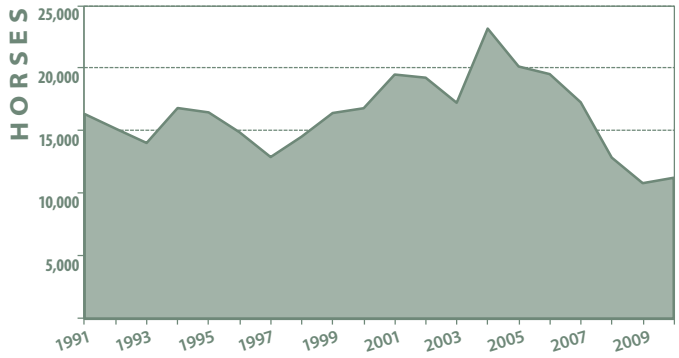

FIGURE 3. **Annual EIA Testing** 1987 - 2010