EQUINE DISEASE QUARTERLY

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COMMENTARY

WORKING EQUIDS ARE THE DONKEYS, MULES, ponies, and horses that are integral to transporting of goods to market, plowing the land, and clearing brush and trees in most of the world. Even if roads were traversable and the terrain could accommodate motorbikes, cars, or small trucks, such vehicles remain beyond the economic reach of most people in developing countries.

Families rely on these equids for their survival, and these animals are highly valued by their owners. Their loss due to injury, disease, or death can throw the family into economic crisis.

Working ponies have been integral to trade in Lampang City, the provincial capital of Lampang Province in northern Thailand. For 90 years the ponies have been a symbol of the city, primarily pulling carriages for the tourist trade but also as working equids of local farmers. In 1998, the possibility of studying an unvaccinated, isolated pony population in this region provided a unique opportunity. Information gained from the owners revealed no routine vaccinations or anthelmintic administration; routine health care was unavailable. Only two of the original 200 ponies in the study had been given a single tetanus toxoid injection.

As a result of geographic location, self-imposed isolation, and the owners' inability to obtain routine health care for their ponies, we needed to offer services of value in exchange for samples we wished to collect to study this population. (The income of many of these families averages 2,000 to 3,000 Baht [$60 to $90] per month.) Our working group provided routine physical examinations, free microchip placement for each pony if the owner agreed, wound care, and access to an at-cost calcium feed supplement to address the ponies' rice-based diet (low calcium, high phosphorous). Big Head Disease (secondary hyperparathyroidism) is prevalent in northern Thailand due to limited varieties of native roughage and grain.

In subsequent years, hair and blood samples were collected, and each pony was administered a tetanus toxoid and drenched with an anthelmintic (see box below). This project represents a collaborative effort of many clinicians and scientists, all of whom have been essential to its success. As remaining testing is completed and as we continue our interaction in coming years, we anticipate using the results to create specific management and health care programs

continued

Lampang Pony Seroprevalence Results

To date, the results from 175 Thai ponies are as follows:

- Dourine and Glanders: Negative.
- Serum antibodies against EHV-4 (type-specific ELISA) were present in 78% of the ponies, and half of those had high titers. Antibodies to EHV-1 were present in less than half of the ponies, and the detectable levels were negligible.
- Equine infectious anemia: Coggins testing of the samples revealed less than 7% positive. Based on the region's subtropical location and insect population, this incidence was unexpectedly low.
- Equine influenza: Antibodies to the A2 strain were not evident, and only low-to-moderate titers to the A1 strain were present.
- Equine viral arteritis: Neutralizing antibodies identified only five presumptive, low-titer positives.
- Leptospirosis: Results indicated a low rate of infection, with only three strongly positive ponies.
- Piroplasmosis *(Babesia equi)*: Evidence of exposure was present in approximately 50% of the ponies.
- Strangles: Even in the absence of discernible clinical signs, individual protein specific assays were positive for *Streptococcus equi,* providing evidence of exposure.
- West Nile Virus and Japanese encephalitis: Results are pending.

IN THIS ISSUE

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LLOYD'S

to address problems affecting the native ponies in northern Thailand and the wider rural pony populations in the region.

More than five years of effort culminated in the opening of the Lampang Pony Clinic in 2004. The clinic provides year-round routine veterinary care, dentistry, farrier services, nutritional advice, and educational programs to pony owners in this province.

Globally, the infectious disease surveillance methods used in France, genetic research in Kentucky, and studies of rural equids in Thailand are contributing to our overall knowledge of horse diseases to promote the best health care and welfare for equids around the world.

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Erratum

Due to a printing error in the July 2008 issue of the *Quarterly,* the vertical axes of Figure 2 were displayed incorrectly in the printed version. The corrected graph is at http://www.ca.uky.edu/gluck/q_jul08.asp#EHV. We apologize for the error.

INTERNATIONAL

Second Quarter 2008

THE INTERNATIONAL COLLATING CENTRE, Newmarket, England, and other sources reported the following disease outbreaks.

A single non-Thoroughbred horse in France and four non-Thoroughbred horses on two premises in Switzerland were confirmed positive for Contagious Equine Metritis (CEM). They included a Lipizzaner stallion recently imported from Hungary, a 3-year-old colt, and a recently castrated gelding. These animals had contact with three other stallions, of which a 5-year-old colt tested positive.

As of August 26, 2008, the United States Department of Agriculture reported 119 cases of Eastern Equine Encephalitis in the USA, the majority (80) in Florida.

Abortions attributable to equine herpes virus-type 1 (EHV-1) were reported from Argentina, sporadic cases on three premises; Ireland, 13 cases and two cases attributable to EHV-4; Japan, two cases on two premises; and the United Kingdom, three cases on three premises. Three EHV-1 abortions were diagnosed by the University of Kentucky Livestock Disease Diagnostic Center during April, making a total of 13 in Central Kentucky for the 2008 foaling season. A single case of the paralytic form of EHV-1 was reported from the United Kingdom, which also reported EHV-3 Coital Exanthema in a Thoroughbred stallion, a donkey, and one other horse on separate premises.

Germany reported one case of Equine Infectious Anemia in a horse that was subsequently euthanized. Three clinical cases of Equine Viral Arteritis were confirmed among three non-Thoroughbred stallions on a single premise in France. Equine influenza was reported among Thoroughbred and Standardbred horses on five premises in France. Japan continued to report cases of equine influenza following the outbreak first reported in the summer of 2007, and cases were also reported from the United Kingdom.

An unspecified number of cases of grass sickness among non-Thoroughbreds occurred on two locations in Switzerland. Piroplasmosis was confirmed among 19 Thoroughbred breeding animals on one premise in Turkey. *Rhodococcus equi* was diagnosed among an unspecified number of non-Thoroughbred animals in Switzerland during May and June. Strangles was reported from Denmark, France, Ireland, and Switzerland.

Thirty-five cases of West Nile Virus infection were reported among the United States equine population in 16 states as of August 26, 2008, with five cases in California and nine in Washington.

During July two separate outbreaks of Hendra virus infection were confirmed in Queensland, Australia. One was among five horses, which included equine patients at a veterinary clinic near Brisbane. A veterinarian at the clinic who contracted the disease died on August 20, and two other members of the staff have been hospitalized. Four horses died and one horse has been euthanized. A second outbreak involved three horses, two of which have been euthanized. Clinical signs among affected horses included neurological signs not previously associated with the disease, including ataxia, head tilt, and facial nerve paralysis.

During August a clinical case of equine piroplasmosis was confirmed on a Quarter Horse training and breeding farm in Florida housing 25 animals. Several premises have been placed under quarantine. As of September 3, 10 horses on three premises have been identified as serologically positive for equine piroplasmosis.

Equine Disease Quarterly

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Syndromic Surveillance of Equine Infectious Diseases in France

THE RESPE (RESEAU D'EPIDEMIO-SURVEILLANCE en Pathologie Equine) is the French surveillance network for infectious diseases in horses and was implemented in 1999. Since January 2008, a new legal status including socio-professional structures has been approved, and the RESPE is now recognized as an association having a significant role in public health.

Since 2000, specific surveillance for influenza, respiratory disease from equine herpes virus (EHV), Equine Viral Arteritis, and nervous system diseases have been systematically developed. Data are collected through the collaboration of approximately 150 sentinel practitioners. For Acute Respiratory Syndrome, criteria for selection of cases are both clinical and epidemiological: a horse is eligible for inclusion when it shows acute hyperthermia with cough and/or serous nasal discharge and/or conjunctivitis. The morbidity rate should be quite high (40-60%) in the stable, and a contagious disease has to be suspected.

For each suspected case, a naso-pharyngeal swab and paired blood samples are required. A case of influenza is confirmed when the result of the naso-pharyngeal swab is positive by ELISA (enzyme-linked immunosorbant assay) or viral culture. A case of EHV is confirmed when the naso-pharyngeal swab is positive for culture or when PCR (Polymerase Chain Reaction) or a Complement Fixation test on paired serum samples shows a fourfold increase of antibodies for EHV.

During the period 2003-06, 545 cases were declared, and 87 cases of influenza and 77 cases of rhinopneumonia (EHV infection) were confirmed. The distribution of the cases along the year showed significant variations: higher for influenza (43/87 cases) in winter and for EHV (42/77 cases) in spring, which was statistically significant ($p<0.01$).

The number of influenza cases was significantly higher among Standardbreds (34/87 cases; 40%; $p<0.01$) and racing horses (56/87 cases; 64%; $p<0.01$). Fifty-nine percent (51/87 cases) of these horses were considered vaccinated against influenza, and the average interval between the last influenza vaccination and the beginning of clinical signs was 190 ± 94 days.

The number of EHV cases was significantly higher among Thoroughbreds (26/77 horses; 34%; $p<0.001$) and racing horses (42/77 cases; 55%; $p<0.001$). Forty-one percent (31/77 horses) of EHV cases were considered vaccinated against EHV.

In June 2007, an outbreak of Equine Viral Arteritis was diagnosed in the west of France. It was a major threat for equine activity in this region. The implementation of control measures was efficient and allowed the yearly sales of Deauville (Normandy) to take place in August.

In the future, the syndromic approach should be developed and generalised. The next step will be to improve the early recording of cases for the detection of outbreaks. The fundamental objective of syndromic surveillance is to identify illness clusters early, before diagnoses are confirmed, and to mobilize a rapid response, thereby reducing morbidity and mortality. Syndromic surveillance aims to identify a threshold number of symptomatic cases, allowing detection of an outbreak days or weeks earlier than would conventional reporting of confirmed cases by the laboratory.

Tracking cases of equine encephalitis for the detection of WNV outbreaks is an example of such syndromic monitoring of an emerging disease. Signs of illness, observed prior to diagnostic confirmation, can be of interest because they may provide an early warning for WNV circulation in a given area and allow authorities to take appropriate preventive measures for public health. To improve the early detection of clinical cases, an in-situ system of automatic electronic reporting has been developed and is currently being tested in the south of France. The veterinary practitioners are equipped with a personal digital assistant (PDA) with mobile communication (Global System for Mobile/General Packet Radio Service; GSM/GPRS). Software has been developed and allows the recording and transmission of clinical data in real-time to a secure Web site. The Web site also provides information from other electronically interconnected practitioners, laboratories, agencies, and institutions. In the case of the 2004 WNV epizootic in Camargue, a retrospective study showed that syndromic surveillance could have provided a warning four weeks before the epidemic period. In comparison, the laboratory-case confirmation in horses could only provide a warning of less than one week before the epizootic.

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Poisoning in Horses

POISONING IN HORSES IS NOT A COMMON OCCURrence, but when poisoning occurs, effects can be disastrous and far-reaching. Listing all toxic substances is impossible, as virtually everything on the planet can be toxic at sufficiently high dosages. What dose is safe and what dose is toxic varies with each toxin, each animal, and each situation. Factors that influence risk from a toxic substance include animal age, concurrent diseases, exposure to concurrent toxins or drugs, reproductive status, and route of exposure. This article will briefly summarize some of the more common toxic substances that can pose risks to horses in North America.

Herbal Supplements: The use of herbal supplements for horses has become common in recent years. Many people believe that if something is "natural," it must be safe and non-toxic. However, some of the most toxic substances on earth are completely natural (such as botulinum toxin, taxine in yew plants, nicotine). Many herbal and natural supplements are inherently toxic, and many herbal products contain impurities and unknown amounts of "natural" ingredients. Herbal supplements are not well regulated, and studies investigating risks associated with use of these products in horses are lacking.

Plants, Feeds, and Feed Additives: Pastures can contain toxic plants and grasses that can pose risks at certain times during the year or under certain circumstances. Too many toxic plants exist to list here, and importance varies greatly with geographic location. However, all weeds should be viewed with suspicion and identified if possible. Additionally, grains can be contaminated with seeds from poisonous plants. Many shrubs, trees, and ornamental plants can be toxic to horses.

Hay and feed pellets can pose a toxic risk when unintended substances are incorporated into the feed. These substances include toxic weeds, toxic insects such as blister beetles, and dead animals that can serve as the origin of botulinum toxin production. Rotting, decomposing feeds or improperly stored haylage can also contain botulinum toxin. Pelleted or supplemental feeds can contain contaminants such as ionophores (such as momensin) or antibiotics due to mixing errors or contamination from transport vehicles. Byproducts from grain distillation can be present in supplemental feeds and can contain mycotoxins and antibiotic residues.

Mycotoxins: Grains may contain fungal toxins. Grain screenings or broken grain pieces carry a higher risk of containing significant concentrations of aflatoxins and fumonisins, both important mycotoxins. Some grass forages can contain mycotoxins such as slaframine and lolitrems. Endophyte-infected tall fescue grass can contain egovaline and other mycotoxins that can cause reproductive problems in horses.

Metals and Minerals: Mineral and salt supplements potentially can contain incorrect concentrations of minerals due to mixing errors or accidental mislabeling. Direct exposure to toxic metals such as arsenic and lead can occur through contaminated soils; dump sites; ashes of burned, treated lumber; some pesticides; and paint from older buildings or bridges.

Pesticides: Pesticides include products designed to kill rodents, fungi, insects, snails and slugs, weeds, birds, and coyotes or other predators. Many horse owners have rodenticide products in their barns, not realizing that anything that will kill a rodent will also kill a horse if the dosage is high enough. Many pesticides contain flavorings or grain bases that are very attractive to horses. Risks from insecticides, fungicides, and herbicides are generally highest with concentrated products or treated seeds.

Industrial Toxins: Contamination of pasture, water, and air can occur from industrial chemicals and petroleum products that are emitted upwind or upstream. Industrial toxins are not a common cause of poisoning in horses, but veterinarians and owners should be aware of nearby industrial and mining activities.

continued

Useful references for poisonous plants:

Knight, AP and Walter RG. A Guide to Plant Poisoning of Animals in North America. Teton New Media, Jackson, Wyoming. 2001

Burrows, GE and Tyrl, RJ. Toxic Plants of North America. Iowa State University Press. Ames, Iowa. 2001

Burrows, GE and Tyrl RJ. Handbook of Toxic Plants of North America. Blackwell Publishing, Ames, Iowa. 2006

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Venomous Animals: Bites from venomous snakes—most importantly rattlesnakes, copperheads, and water moccasins—are common occurrences in horses in the southern and western parts of North America. Bees, wasps, black widow spiders, fire ants, and brown recluse spiders can also pose risks to horses.

Horse owners, farm managers, and veterinarians should be aware of the myriad of potentially toxic substances that can pose risks to horses and take steps to minimize the chance that poisoning will occur.

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KENTUCKY

Contracted Foal Syndrome

THE SKELETAL ANATOMY OF A HORSE'S FRONT AND hind limbs is comparable to the anatomy of the human hands and feet. The horse's cannon bone, or metacarpal, is the same as a bone in the palm of a hand. The human phalanges, or finger bones, are comparable to the bones making up a horse's hoof and pastern. Fortunately, most humans and horses are born with normal limbs. However, both children and foals can be afflicted with contracted limb abnormalities.

When a child is born with tightly clenched fists and club feet, it may have one of several muscle contracture syndromes collectively known as *Distal Arthrogryposis* (DA). The child may or may not have other congenital abnormalities, such as spinal curvature (scoliosis), facial muscle contractures, or a small mouth.

DA is caused by mutations in one or more genes that control skeletal muscle contraction. These gene mutations cause abnormal muscle protein production that disrupts normal muscle function. The skeletal muscles contract but are unable to relax, causing limb contractures during fetal development. Most of the mutations are inherited, but the mode of inheritance can vary. Symptoms can vary markedly within and between families. Mutations can arise spontaneously as new (*de novo)* mutations. Some children with DA respond to surgery and physical therapy; others do not.

When a foal is born with limb contractures preventing it from standing or walking normally, it is said to have contractures, or Contracted Foal Syndrome (CFS). CFS is the most common congenital anomaly in horses diagnosed at the University of Kentucky's Livestock Disease Diagnostic Center (LDDC). The signs of CFS are similar to those seen in human DA. The severity of CFS varies in horses, just as DA varies in humans.

Foals may have a mild form of CFS or exhibit only one affected limb. They may recover with surgery, splinting, or other therapy. Alternatively, foals may present with severe CFS involving contractures of all four limbs and may exhibit other anomalies, including neck flexion (torticollis), facial bone deviation (wry nose), and spinal curvature (scoliosis). Muscle, tendon, and ligament tissues appear normal when examined microscopically by pathologists. CFS has been found primarily in Thoroughbreds at the LDDC, which may be a reflection of the Thoroughbred-dominant equine population in Central Kentucky—other breeds may dominate in other parts of the country. The condition appears to be distributed equally between males and females. If severely affected foals survive delivery, they are usually euthanized due to the inability to stand and nurse.

Mares carrying foals with CFS may experience dystocia at delivery, thus endangering the life of the mare. Although CFS is not widely regarded as an inherited disease, breeding records indicate that a hereditary risk factor may exist. Some mares have produced up to four CFS foals, each one sired by a different stallion. These mares may have been housed on different farms during each pregnancy, therefore ruling out a management component. Findings in individual cases suggest CFS may be inherited in a dominant fashion, with its development depending on other genetic factors. That would explain why some foals have a mild form of CFS and others have a severe form.

The availability of the horse genome sequences is facilitating our study of CFS. The DNA sequence information for any horse gene of interest can be downloaded from Internet databases. The necessary tools can be prepared for sequencing candidate genes from affected and non-affected individuals. Based on the gene mutations causing DA in humans, we have selected and are currently sequencing candidate genes in an effort to identify mutations that cause CFS.

Even though this research has begun, success will depend on continued support from the horse industry, especially through providing research samples from foals and information on sires and dams that have produced one or more foals with CFS. All information is kept confidential, including the identity of horses and farms. We expect one day to develop a diagnostic test that will provide information to allow farm managers to avoid matings that will produce CFS foals and to determine which foals will respond to treatment. The participation of breeding farms, veterinarians, and horse owners is imperative if the cause of CFS is to be identified.

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