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COMMENTARY

IN THIS ISSUE

University of Kentucky
College of Agriculture, Food and Environment
Department of Veterinary Science

LLOYD'S

"The more things change, the more they remain the same."

The epigram was written by Alphonse Karr during his tenure as editor of the French satirical magazine *Le Figaro* during the middle years of the nineteenth century. The intended meaning has been the subject of debate over the years, but placed in the context of international equine health reporting, Karr's musing on change and permanence is a perfect fit for the Equine Disease Quarterly (EDQ).

The EDQ was established in October 1992 as a collaboration between the University of Kentucky's Department of Veterinary Science, insurance giant Lloyd's of London, and local Lloyd's agents. Its purpose, according to the EDQ's first Commentary, was to provide accurate information on equine diseases at three levels: in Kentucky, in the United States, and internationally.

Twenty-five years and 100 issues later, despite ground-breaking changes in technology, a global recession, and the emergence of new diseases and threats from old ones, dedication to the EDQ's original goal never has wavered. The publication is, as it always has been, a primary source of accurate and unbiased information for the international equine community. However, 25 years have seen significant changes.In 1992, the Dow Jones Industrial Average was 3,300. A first-class stamp cost 29 cents. People paid $2,300 for a laptop computer ($4,000 adjusted for inflation). The leading Thoroughbred sire was Danzig.

The first edition of the EDQ had a mailing of 2,000. Now more than 14,000 copies are mailed to individuals in 100 countries and the publication is translated into Japanese. Unlike most commercial, copyrighted equine publications, articles in the EDQ can be reprinted in their entirety with proper acknowledgement. This "secondary" distribution of EDQ information has included veterinary clinic newsletters, equine industry publications, and vast distribution via equine information websites.

The International Collating Report in the 1992 inaugural edition covered four diseases in 59 words of copy: influenza, contagious equine metritis, strangles, and equine herpesvirus-1 abortions. In the October 2017 edition of the EDQ, the International Collating Report included reports of 24 different diseases and occupies a full page of text.

Sincere thanks goes to everyone associated with Lloyd's of London for continued financial support of this unique publication. Thank you to the cadre of editors, graphic designers, and staff at the University of Kentucky who work diligently to produce a quality publication. To the authors of articles, thank you for your time and effort in condensing complex concepts and data into meaningful, practical information of 700 words or less for the benefit of the horse industry and without a stipend.

Much has changed in the world and the horse industry in a quarter century. The Equine Disease Quarterly remains free to anyone upon request by print or email. All editions of the EDQ are available online at http://gluck.ca.uky.edu/equine-disease-quarterly and serve as a historical source of information on many disease conditions.

And, in closing, thank you to the readers who provide valuable feedback and commentary of your own.

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INTERNATIONAL

Third Quarter, 2017

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

Denmark, France, Germany, South Africa, Switzerland, and the USA reported occurrences of strangles. The number of recorded outbreaks varied from one in Denmark, 12 in France, seven in Germany, sporadic occurrences in South Africa, and two in Switzerland. The USA reported the disease as endemic. At least 33 outbreaks were confirmed in 13 states, with multiple cases diagnosed on affected premises in four states.

Influenza was reported by the UK (two outbreaks, both involving recently imported Irish Draft horses) and the USA (a single outbreak).

Germany, South Africa, and the USA recorded equine herpesvirus 1 (EHV-1) related diseases. EHV-1 respiratory infections were reported in various states in the USA. Cases of abortion were diagnosed in South Africa (two cases and one death in a neonatal foal) and the USA (isolated cases on four premises). Neurologic disease due to EHV-1 was recorded by Germany (one outbreak involving four horses) and the USA (two outbreaks in Virginia, one involving two cases and the other, four cases of the disease, two of which died or were euthanized).

Respiratory disease associated with equine herpesvirus 4 infection was reported by France (nine outbreaks), Germany (four outbreaks), South Africa (single case), and the UK (two outbreaks, each involving a single case of the disease).

Canada and the USA confirmed cases of equine infectious anemia during the period under review. In Canada, the infection was diagnosed on two premises in Alberta and five in Manitoba. The total number of infected horses was 14, of which 12 were identified during pre-entry import testing for events and two represented follow-up testing. The USA recorded EIA in five states: Colorado (two cases), Illinois (one case), Kansas (three cases), North Carolina (single case), and Oklahoma (two cases).

Equine piroplasmosis was recorded by France (endemic), South Africa (infection confirmed in five provinces), Switzerland (single case), and the USA (multiple cases in several states with a vast majority in Quarter Horse racehorses; iatrogenic transmission confirmed or suspected).

Germany diagnosed contagious equine metritis in ten Icelandic horses located on five premises.

The USA reported ten cases of Salmonellosis involving infection with serogroup B Salmonellae and five with serogroup C3 Salmonellae.

Multiple cases (27) of equine neorickettsiosis were diagnosed in Kentucky, USA.

Proliferative enteropathy due to *Lawsonia intracellularis* was confirmed in several foals in Kentucky.

France recorded five outbreaks of rotavirus infection, most involving single cases of the disease.

Eastern equine encephalomyelitis was recorded in the USA. The disease was diagnosed in 39 horses in six states, the largest number in Wisconsin.

South Africa and the USA reported cases of West Nile encephalitis. A total of 135 cases were diagnosed in 15 states in the USA, the majority during the month of September.

Rabies was confirmed in the USA with single cases recorded in Minnesota and North Carolina.

Rhodococcal related disease was reported as endemic in the USA with 27 cases diagnosed during the period under review.

A case of tetanus was recorded in a foal in Japan, equine encephalosis in South Africa, seasonal pasture associated atypical myopathy in Ireland, and ehrlichiosis in Switzerland.

The Role of Footings in Musculoskeletal Disease and Performance

The surface is one of the most common factors cited when an unexpected performance or injury occurs with a performance horse. While the importance of surfaces can easily be overstated, unlike many other risk factors, surfaces impact every horse which competes at a venue. Epidemiological research also shows that the type of surface—dirt, turf, or wax-coated sand—has a statistically significant effect on injuries even when other factors are considered.

Equine Disease Quarterly

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The mechanism responsible for the effect of surfaces on musculoskeletal disease is well established. The skeleton of the horse adapts to the dynamic loading of the bone. To minimize excess structure and to provide sufficient bone in highly loaded regions, bone is absorbed and deposited. The remodeling process produces a skeleton that is adapted to the training of the horse. Building the optimal skeleton requires that the horse performs the specified task during training. The type of loading during training should match the expected loading during competition. However, the maximum performance may not be desirable during training; for example, the training distance may be shorter or the jumps lower. The overall loading directions should match that expected in competition and depends not only on activity but also on the manner in which the surface supports the horizontal and vertical loading by the horse.

Both the load rate and the magnitude of loading is critical to bone remodeling and the risk of fracture. Surfaces must also provide appropriate footing during all phases of the gait. Consider the initial loading on the leading foreleg of a horse at a gallop to illustrate the demands. During the initial impact of the hoof the loads are low, but the impact of the hoof on the surface occurs at a high speed. The loading, or firmness of the surface, primarily affects the peripheral bones in the leg. The smaller bones that have adapted to maximize the efficiency of the horse are quite susceptible to damage. During the secondary loading, the dynamic weight of the horse is transferred to the leg and long bones of the horse are then loaded. The cushioning of the surface reduces the rate of loading of the bones and the risk to the more proximal bones of the leg. While more research is needed, it is likely that both the training and competition surface should have optimal cushioning and firmness to ensure proper development of the skeleton while reducing the risk of injury. In addition to these two factors, cushioning and firmness, three additional characteristics have been developed to characterize the surface response for equestrian competitions, namely responsiveness, grip, and uniformity.

To minimize risk during competition and to support required bone development in training, further research is needed to better understand the effects of surfaces on performance and injuries of the athletic horse. In the interim, the current state of knowledge has been reviewed in white papers for racing and equestrian sports. Improved processes for the testing and approval of surfaces such as those under development by the International Federation for Equestrian Sports (FEI) show great promise for implementing current knowledge in a way that best protects both horse and rider. Improvements in surfaces along with many other industry efforts have led to some of the recent reductions in catastrophic injuries in race horses, a critical effort for the protection of the racing industry as well as all equestrian sports.

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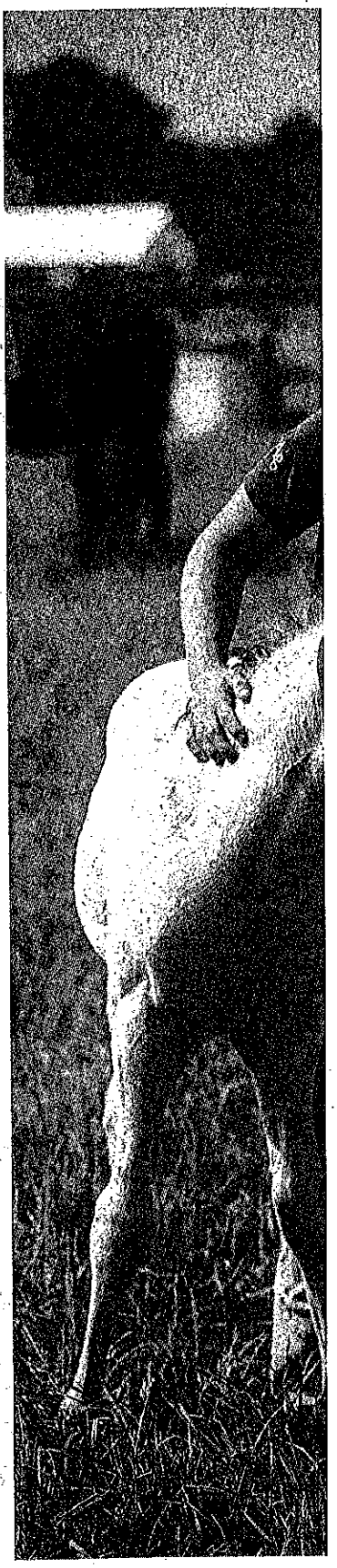

NATIONAL

Diagnostic Approach to Equine Neurological Diseases

Many diseases can affect the central nervous system of horses but four of the most common disorders are cervical vertebral stenotic myelopathy (CSM), equine protozoal myeloencephalitis (EPM), equine degenerative myeloencephalopathy (EDM), and equine herpesvirus 1 myeloencephalopathy (EHM).

Regardless of the cause, diagnostic evaluation begins with a neurological examination, which provides anatomic localization of the problem within the central nervous system. Then the diagnostic investigation continues with more focused testing.

If CSM is strongly suspected, radiographs of the neck should be taken. Narrowing of the cervical vertebral canal in combination with malformation of the cervical vertebrae results in compression of the spinal cord in CSM patients. Standing lateral radiographs of the cervical vertebrae often reveal bony malformations and probable narrowing of the vertebral canal. Myelography is an important antemortem diagnostic tool and is essential prior

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to surgical intervention. CSM occurs primarily in young horses (3 months to 1 year of age) where it is a multifactorial disease. In older horses, CSM is often secondary to osteoarthritis of vertebral articular process joints.

The neurologic exam for suspect EPM horses shows asymmetric ataxia, often with upper and lower motor neuron signs and muscle atrophy. *Sarcocystis neurona* is the most common cause of EPM, but *Neospora hughesi* infection can also cause similar clinical signs.Several studies of *S. neurona* demonstrate that horses residing in states with opossums have an exposure rate of 33% to 53%. The exposure rate for *N. hughesi* appears to be much lower, although less epidemiologic data is available for this organism. Risk factors for *S. neurona* infection include age (< 5 and >13 years), time of year (summer and spring more than winter), whether previous cases had been recognized on the farm, presence of a wooded area, and presence of opossums on the farm. Prevalence of the disease was reduced on farms where wildlife had little or no access to feed and if a creek or river was on the premises. Diagnosis of EPM remains a challenge and should begin with physical and neurological examinations. This is followed by measurement of antibodies against the causative organisms in blood and CSF. Unfortunately, the only definitive test for EPM is a postmortem examination.

The third common cause of spinal ataxia in horses is equine degenerative myeloencephalopathy (EDM). This condition has been recognized in several breeds and has a familial predisposition. EDM is caused by oxidative damage to proprioceptive relay tracts, thus measurement of vitamin E has been used as a marker for this condition. More recently a genetic marker has been associated with the disease and genetic testing has proved valuable.

Equine herpesvirus 1 myeloencephalopathy (EHM) is an infrequent but serious outcome of equine herpesvirus 1 infection. Although the virus has been recognized for a long time, a link to neurological disease was only made in the past fifty years. More recently, a point mutation in the virus has been identified that allows it to replicate rapidly and results in a higher frequency of neurologic disease. Damage to the nervous system develops near infected blood vessels, which results in "stroke-like" episodes. The disease usually follows an initial phase of viral replication in the respiratory tract and peripheral blood mononuclear cells. Viral replication also occurs in respiratory epithelium, gonadal cells, and tissues of the gestating fetus. Infection can result in fever, respiratory disease, weak foals, abortion, and neurological disease. Neurologic signs often include ascending paralysis with urine dribbling, loss of anal tone and control, poor tail tone, and pelvic limb weakness.Diagnosis of EHM is easier to establish when several horses on the same premises present with fever, followed by ataxia and urine dribbling and in some cases abortion. When spinal fluid is collected it often appears xanthochromic as a result of the vascular damage leading to increased protein but no increase in cell count. Beyond this, diagnosis can be established by recognition of clinical signs and positive EHV-1 PCR results of a nasal swab and buffy coat. Confirmation of the disease is by virus isolation in cell culture.

Recognition of specific clinical signs, anatomic localization of lesions, and utilization of diagnostic tests can help differentiate the common neurologic diseases.

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Traceability of Equine Microchips

For years, equine owners have been implanting microchips into horses for unique and unalterable identification. While the safety and practicality of this practice is well-established, there is little information available about traceability of microchips. Given the long lifespan of horses, the ability to trace microchips over many years is necessary.

Reasons to trace microchips are few, but vital when encountered. Regulatory officials use the microchip of a horse involved in a disease investigation to trace back to additional exposed horses or premises. First responders to natural disasters have significant challenges in identifying ownership of displaced horses. Individuals searching for a lost or stolen horse have a critical reliance on the

traceability of microchips. Equine rescue groups encounter horses that have lost their identity and endeavor to trace any permanent identification available to uncover their history.

Current methods available for tracing microchips are limited. Each trace begins with scanning a horse with a microchip-reading device and obtaining a microchip number. But what next? If the phenotype or history of the horse presents clues to a breed or discipline group that might have the horse's information, this is often the best place start. If there is no obvious place to begin the inquiry, then one contacts the manufacturer of the microchip. The first three digits of the microchip number indicate the manufacturer or country code, which can be looked up online. The manufacturer provides contact information for the distributor to which the microchip was sold. Contacting the distributor yields information for the next entity that acquired the microchip until an entity is reached that maintains data connecting the microchip to the horse. It can be a grueling process.

Attempts to trace microchips have highlighted some significant challenges. There are multiple parties involved in and expectedly responsible for keeping records associated with a microchip. Failure to keep or transfer records at any step in the pathway yields a permanent dead end, rendering the microchip essentially useless. The best outcomes in tracing have been achieved when the end information is maintained by breed registries or other equine industry groups with a vested interest in connecting the horse to its unique identification. Contact with the manufacturer has reliably been successful in obtaining the distributor information, but this approach is time consuming and not practical in urgent situations, such as a contagious disease outbreak.

Some microchip manufacturers do not require distributors to maintain records on each microchip sold, which results in a dead-end trace. Finally, a publically accessible online lookup tool for equine microchips is needed to streamline the trace-back process. Such a lookup tool could provide quick identification and contact information of the main entity (breed registry, discipline group, registration system) holding information on that particular microchip number while maintaining the security and confidentiality of the data until a specific request is made for information disclosure. Above all it must be recognized by the equine industry that simply implanting microchips in horses is not enough. There must be maintenance of data and structure of traceability built in behind the microchips for their intended purposes to be fulfilled.

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KENTUCKY

Reducing Horseracing Fatalities: What Have We Accomplished and Where Do We Go from Here?

The occurrence of fatal injuries to horses in flat racing in North America has decreased by 23% since the inception of standardized injury reporting into the Jockey Club's Equine Injury Database. The declining trend in fatalities began in 2013, and achieved statistical significance by 2015. This reduction, we believe, can be attributed to meaningful change within the culture of horse racing as expressed in multiple safety initiatives. In Kentucky, this change has manifested not only as a decrease in racing fatalities, but also decreases in regulatory veterinarian-initiated scratches for unsoundness and the number of horses observed to be unsound post-race. These findings are evidence that the overall health of the racing population has improved. Multiple safety initiatives have been implemented and credited for contributing to the improved safety record. Examples include:

- Constraints on traction devices on horseshoes
- Changes to the regulation of therapeutic medications
- Systematic, objective monitoring and management of racing surfaces
- Implementation of "voided claim" regulations

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- The National Thoroughbred Racing Association's Safety and Integrity Alliance accreditation of racetracks
- Necropsy programs and Mortality Review panels
- Employment of Safety Stewards
- The adoption of an Association of Racing Commissioners' Model Rule on the Veterinarians' List

Others assert that the decreased occurrence in fatalities is an expression of the Hawthorne Effect, in which there is an improved outcome as a consequence of a population's awareness of being observed. This is perhaps not so rewarding as the idea that the combined effort of the entire spectrum of racing stakeholders made it a safer sport. But at the end of the day, either way, we'll take it. The 23% reduction in racing fatalities is not an abstraction. Hundreds of horses did not die that in the past might well have.

The important message is that the occurrence of racing fatalities is *not* immutable. This should serve both as encouragement and warning. Encouragement in that positive change is possible, and so efforts to improve safety should, and must, continue. There is additional work to be done through investigating biomarkers of early onset orthopedic disease, improving decision-making at all levels that further safeguards the long-term health of the horse during and after its racing career, identifying business models that incentivize human and equine health and safety, and developing relevant and engaging continuing education programs for all those in contact with race horses. And the warning? Change can also be negative. Complacency, the assertion of a mission accomplished, puts horses and their riders as well as the sport as a whole at risk, should racing fatalities be allowed to increase as a consequence of inertia and a loss of vigilance. The occurrence of racing fatalities in North America continues to exceed that experienced elsewhere in the world. Until North America can legitimately be acknowledged as a leader in protecting the health, safety, and welfare of race horses and those who ride or drive them, our work is far from done.

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