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LLOYD'S

COMMENTARY

You can't believe everything you read, hear, or see.

Critical thinking is more important than ever, and I am continually amazed at the erroneous, misleading information to which we are exposed.

Always be wary of grandiose statements.

When Zika virus made the headlines in the U.S., an "expert" on the national news stated "all we have to do is kill the mosquitoes" to keep the disease out of North America. And, he wasn't making a joke.

One only has to look online at news reports from late 1999 to find reassurances by public health officials that citizens didn't need to worry about the "new" West Nile virus returning in summer 2000 due to a full-scale campaign to spray insecticides to kill mosquitoes. Look how well that worked.

Mosquito-borne illnesses are difficult to control because of the resilience and breeding efficiency of these insects. While there is no evidence that Zika virus affects horses, other mosquito-transmitted viruses such as WNV affect hundreds of horses each year, despite available effective vaccines and annual reminders to horse owners about mosquito control.

More grandiosity …

A national Sunday newsmagazine supplement recently published an article stating that Good Samaritan laws in every state protect people against liability if they try cardiopulmonary resuscitation (CPR) on a person. The article also went on to state that "you can't be sued for trying [CPR]." Both statements are completely wrong. Kentucky law (for example) does not protect everyone who attempts CPR, and lawyers can sue for anything. Learn how to perform CPR and know the laws and liability protections in your state.

Who is a veterinary "specialist?"

I've seen several websites that tout the sponsoring veterinarian as a "specialist in sport horse medicine" (for example). According to the American Veterinary Medical Association, a veterinary specialist is a veterinarian "who has completed additional training in a specific area of veterinary medicine and passed an examination that evaluates their knowledge and skills…." Considering the rigorous training involved in obtaining "Diplomate" status, veterinary specialists almost always include this in their educational background, such as Diplomate, ACVS for veterinary surgeons, or Dipl. ABVP (Equine) for American Board of Veterinary Practitioners in Equine Practice. The term "specialist" means additional education, training, rigorous examination, and continuing education. Many exceptionally skilled veterinarians have practices that involve primarily sport horses. However, if they are not board certified, they are not "specialists."

Let's talk about "certifications." Business cards or websites for some people boast an impressive list of certifications and letters after the individuals' names. But, are they legitimate, meaningful indications of advanced, specialized education or experience? Or simply that the person paid money for a weekend's worth of training that barely scratched the surface, but resulted in being presented with a "certificate?" Investigate the organization online to determine what training, testing, and "certification" was actually involved. You may be surprised.

Critically evaluate what you read, see, and hear. Ask questions. Assume nothing, and if it is too good to be true, it usually is (but find out anyway).

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INTERNATIONAL

Fourth Quarter 2015

The International Collating Centre, Newmarket, United Kingdom; Equine Disease Communication Center, USEF, Lexington, KY, USA; and other sources reported the following disease outbreaks.

Vesicular stomatitis continued to spread during the period under review, with 134 virus-confirmed premises and an additional 485 premises on which the disease was clinically diagnosed but not virologically confirmed. All confirmed outbreaks have been caused by the New Jersey serotype. New outbreaks were diagnosed in each of the eight affected states: Arizona, Colorado, Nebraska, New Mexico, South Dakota, Texas, Utah, and Wyoming; the greatest increase of cases were detected in Colorado and Wyoming.

Influenza was reported by the UK and the USA. Isolated cases were diagnosed on four premises in the UK, of which the majority were in unvaccinated horses. A fifth premises in the UK involved an outbreak of five cases, all Andalusians. Influenza was considered endemic in the USA with disease confirmed in Florida, Kentucky, Michigan, Ohio, Oregon, and Texas.

Equine herpesvirus (EHV) 1- and 4-related diseases were recorded in France, Germany, Ireland, Japan, the UK, and the USA. Respiratory disease caused by EHV-1 was confirmed in France (a single outbreak), Ireland (seven cases), and the USA (activity recorded in several states). EHV-1 abortion was reported by Japan (eight cases in vaccinated mares on seven premises), the UK (two cases in Thoroughbreds), and the USA (three cases). Two outbreaks of equine herpesvirus 1 myeloencephalopathy were recorded in the USA, both in Pennsylvania—one at a racetrack and the other at a riding stable; the latter resulted in three deaths. France and Germany reported outbreaks of EHV-4 respiratory disease. Nineteen outbreaks were confirmed in France, most in French Trotters, and single cases were confirmed on three premises in Germany. A small number of cases of infection with EHV-2 and/or -5 were diagnosed in the USA.

A single case of equine coital exanthema (EHV-3) was confirmed in the USA.

Strangles was reported by Australia (24 outbreaks involving 48 cases), France (11 outbreaks), Germany (single cases on three premises), Ireland (20 cases involving three provinces), Switzerland (one outbreak), United Arab Emirates (eight cases on two premises), and the USA (disease is endemic; 17 outbreaks in seven states).

Canada confirmed 13 cases of equine infectious anemia. These occurred on seven premises located in British Columbia (2), Alberta (3), and Saskatchewan (2), both of which were linked epidemiologically.

Equine piroplasmosis was reported by France (disease endemic) and Switzerland (a case of dual infection with *Babesia caballi* and *Theileria equi* in an imported animal).

The USA confirmed outbreaks of salmonellosis, some associated with Group B *Salmonella* spp and others with Group C1 *Salmonella* spp. Multiple cases of proliferative enteropathy caused by *Lawsonia intracellularis* were diagnosed in several states in the USA. A single case of clostridial enteritis associated with *Clostridium perfringens* type A toxin was confirmed in Kentucky.

France and the USA reported cases of leptospiral abortion. A single case was diagnosed in France and 12 cases were diagnosed in Kentucky, USA.

A total of 23 cases of Eastern equine encephalomyelitis were confirmed in the USA, with the greatest numbers recorded in Florida, Texas, and Georgia. France and the USA reported outbreaks of West Nile encephalitis. A total of 45 cases involving 34 outbreaks were diagnosed in France. The USA recorded 160 cases, most of which were confirmed in Texas, Washington, Missouri, and California.

A single case of Hendra virus infection was reported in Queensland, Australia during the third quarter of 2015.

Equine Disease Quarterly

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Equine Herpesvirus Associated Ocular Disease

Herpesviruses are widely disseminated in nature and renowned in equine medicine for inducing respiratory, reproductive and neurological diseases. The most important biological characteristic of these viruses is their ability to remain latent. Reactivation of latent virus can occur and result in virus replication, shedding, and disease. While the precise mechanisms of reactivation are unclear, it is believed to be triggered by stressors such us exercise, pregnancy, changes in management, or concurrent disease. The equine herpesviruses (EHV) that have been implicated in ocular disease, to date, are EHV-2 and EHV-1.

Equine herpesvirus-2 has been proposed as the putative and primary cause of viral keratitis in the horse. Nevertheless, the virus has been inconsistently found in corneal and conjunctival scrapes of affected animals and can be frequently found in asymptomatic horses. In addition, co-infection with EHV-5 is common, not only in ocular disease but also in respiratory cases, making it difficult to attribute causation of disease to a particular virus. Evidence for EHV-2 induced ocular disease is based on several reports of successful virus isolation from outbreaks and single cases of keratoconjunctivitis, conjunctivitis, or corneal edema in foals; however, despite such reports its role as a pathogen is still debatable. In contrast to other viral etiologies, herpetic keratitis is not usually accompanied by systemic disease. Clinically, horses have sporadic, multifocal, subepithelial, punctate opacities that stain variably with fluorescein but commonly with Rose Bengal. Superficial vascularization is associated with the opacities, and horses exhibit persistent to moderate ocular pain that can lead to reflex uveitis. Continuation of the epithelial lesions into the corneal stroma is possible as a consequence of viral antigens extending from epithelial lesions or from viral replication in stromal cells. Evidence of virus in corneal and/or conjunctival scrapes may be challenging as viral inclusion bodies, within injured epithelium, are rarely seen at the time of sampling. PCR techniques are more reliable in detecting viral DNA; however, the presence of herpetic DNA is not diagnostic of itself. Corneal lesions in the horse seem to resolve quickly after antiviral treatment or heal spontaneously, which is in contrast to human and feline induced herpesviral ocular disease. Treatment with topical antivirals is often recommended if there is a strong suspicion of herpesvirus involvement and subsequent PCR confirmation. Topical ganciclovir gel in combination with topical corticosteroids has been recommended as the treatment of choice.

Chorioretinal lesions have been described following experimental EHV-1 infection in several studies. Focal and multifocal lesions, either unilateral or bilateral and located in the non-tapetal fundus as donut-shaped depigmented regions with pigmented centers were observed several weeks after infection. This type of lesion is most likely caused by ischemic injury of the chorioretina with death of the overlying retinal pigment epithelium. These findings do not seem to impact vision, but are a main concern during pre-purchase examination, particularly if previous history is unknown.

Although there is sufficient evidence to support the role of EHV-1 in chorioretinitis, the implication of any member of the equine herpesvirus family in corneal disease remains controversial.

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NATIONAL

Eastern Equine Encephalitis

Eastern equine encephalitis (EEE) is an annual disease threat to horses in the Gulf and Atlantic Coast states and the Great Lakes region. Occasional cases have been reported as far north as Canada and from some inland states such as Iowa, Arkansas, and Kentucky. The causative agent, Eastern equine encephalitis virus (EEEV), is silently maintained by a songbird/mosquito transmission cycle. Infected ornithophilic ("bird-loving") *Culiseta melanura* mosquitoes living near freshwater hardwood marshes transmit EEEV to nestling songbirds; subsequently, new hatches of mosquitoes acquire the virus by biting the infected birds. The ecological range of *C. melanura* limits the westward extent of EEEV infections.

While songbirds do not become ill from the infection, transmission of EEEV to other birds, horses, or humans can cause disease. Transmission of EEEV to mammalian hosts involves mosquito vectors with broader feeding habits such as *Aedes* spp. In temperate regions, EEE cases in horses have a summer/fall seasonality with few cases occurring in cool months and complete cessation in the winter. In subtropical regions such as Florida, there is year-round risk of EEE transmission with a peak in the summer months. Horses and humans are not part of natural maintenance of EEEV as they do not produce sufficient viremia to allow transmission to mosquitoes. They are considered dead-end hosts.

Once an equid is infected by a mosquito bite, clinical signs can appear in 5-15 days. EEEV infections in horses, mules, or donkeys are typically severe and up to 90% of ill horses do not survive the infection. Clinical signs range from fever and/or dull mentation (thus the old name "sleeping sickness") to blindness, loss of coordination, head pressing, inability to rise, seizures, and death. Fevers in the acute clinical phase may be very high (e.g. 105-106°F).

Clinical signs associated with EEE can overlap those observed with West Nile encephalitis or equine herpesvirus 1 myeloencephalopathy (EHM), thus laboratory confirmation of EEE is critical. A combination of clinical signs, appropriate environment, and lack of appropriate vaccination history along with a positive EEE IgM Capture ELISA serologic test confers a strong presumptive diagnosis of EEE. For horses that die or are euthanized, PCR identification of EEEV nucleic acid in the brain, isolation of EEEV from brain tissue, or specific staining of fixed brain tissue confirms the diagnosis.

Despite widely available and effective USDA licensed vaccines, each year horses in North America succumb to EEE. The American Association of Equine Practitioners considers EEE vaccination among the core vaccines and has specific risk-based guidelines established by age and residence of the horse. As the vaccines are killed virus products, adherence to a 2- or 3-dose primary series is critical to engender protective immunity in foals.

In 2014, a total of 136 equine cases of EEE were reported from 15 states. The USDA Animal and Plant Health Inspection Service (APHIS) Veterinary Services (VS) branch collaborates with the U.S. Centers for Disease Control and Prevention (CDC) and state veterinary and public health officials to facilitate communication about EEE disease cases in horses and confirm equine cases in each state. CDC collects EEE case information using its ArboNET reporting system, an electronic surveillance and reporting system used to track and report arboviral activity, including EEE, in humans and animals. During the transmission season, VS disseminates the equine arbovirus case information to state animal health officials for confirmation and posts the number of confirmed cases to the USDA equine infectious anemia disease information website (http://www.aphis.usda.gov/animal-health/equine-health).

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Syndromic Surveillance and Spatial Epidemiology

Syndromic surveillance is the use of existing health data to provide real-time analysis and feedback to epidemiologists in the investigation of disease outbreaks. Spatial epidemiology is a subfield of health geography that allows the study of the distribution of disease and health outcomes. Utilizing both approaches allows for the mapping of disease geographically for correlation studies and detection of disease clusters (e.g. unusually high incidence of a particular disease or syndrome occurring in close proximity in terms of both geography and time). These methods are used to improve early detection of disease outbreaks or biologic terrorism in human and veterinary medicine.

Over the last ten years, the University of Kentucky Veterinary Diagnostic Laboratory (UK VDL) has established an epidemiology section and implemented multiple surveillance, reporting, and alerting systems to monitor animal health. Utilizing a custom syndromic event simulator, the UK

VDL uses test results and syndromic events (e.g. abortions, cases of respiratory disease, number of deaths) to monitor the health of Kentucky's animal population to predict and model early disease outbreaks. This simulator monitors each day's syndromic events combined with the previous 29 days of data to create a "moving" 30-day window. These data are then compared with historical data during the same time frame over the last 5 years (e.g. background rate of disease bounded by time and space). This mathematical approach allows us to statistically calculate if increased levels of specific events are occurring. Any data set that indicates an increased level of disease is then geocoded into map coordinates to alert UK VDL epidemiologists of a potential outbreak. Any indication by the program of a possible outbreak is then investigated and verified by the epidemiology section. Upon verification of an increase in sickness or deaths, the UK VDL then alerts Kentucky veterinarians and officials.

Aside from surveillance, the UK VDL utilizes necropsy and test data to generate a Kentucky animal health map that is published on our website at vdl.uky.edu. This map allows users to click on any county in Kentucky and see what diseases have been diagnosed during the last month. If a county lacks information, then it means no cases have been diagnosed in that county at the UK VDL. The map does not identify owners or the specific location in which the disease was diagnosed, only the county of the submitting veterinarian. This allows us to maintain client confidentiality while at the same time providing users with a method of determining the diseases in their area, so that biosecurity measures can be implemented or increased.

While syndromic surveillance and spatial methods of epidemiology are always evolving and being refined, it should be noted that there are some challenges to these methods. Spatial epidemiology is almost always based on data analysis. Because of this, data collection must be routine and accurate. Syndromic surveillance currently used by the UK VDL depends upon the data collected solely at this laboratory; the inclusion of field data from veterinarians or other laboratories would further enhance this important surveillance technique.

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KENTUCKY

Kentucky Mosquitoes

Kentucky is home to more than 50 species of mosquitoes with a range of breeding sites and survival strategies. Some thrive when above-normal rainfall creates temporary ground pools; others develop in small accumulations of stagnant water during dry periods.

Many of our mosquito species spend the winter as freeze-resistant eggs that can survive prolonged harsh conditions. A few, such as the house mosquito (*Culex pipiens*), spend the winter as adults in protected places. They are vulnerable to severe cold, but like most insects have the reproductive capacity to build numbers by late summer, even if winter mortality is high.

Several mosquito species feed on horses with varied effects that range from adverse skin reactions to disease transmission. Proteins injected in mosquito saliva can produce irritating bites that can cause skin reactions in sensitive individuals. The inland floodwater mosquito (*Aedes vexans*) is a widespread pest that can develop in any ground pool that lasts 10 to 14 days. It causes a significant and chronic problem in some parts of the state and can give rise to several generations each year. Females rest on vegetation and shaded grass during the day and bite viciously at dusk and after dark. They can live for several weeks and may travel several miles during that time. Feeding by large numbers of these mosquitoes at night can produce dermatitis and itching in horses on pasture.

Feeding habits, the ability to sustain and pass viruses, and host preferences for blood meals affect the potential for some mosquito species to serve as disease vectors. Some mosquito species feed primarily on mammals, others on birds, and some are opportunistic. Ornithophilic mosquitoes (*Culex pipiens* group) can maintain an avian cycle of Eastern equine encephalitis, Saint Louis

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encephalitis, and West Nile viruses among various bird species. Some of these mosquitoes serve as bridge vectors for viruses when they initially feed on infected birds and then take blood meals from mammals.

The rapid spread of West Nile virus across the U.S. required quick action to manage vector mosquitoes in an effort to protect equines and humans. Mosquito management takes a multi-pronged approach including source reduction, screens, and protection using repellents and insecticides. Fortunately, a combination of factors—selection for immunity in the avian population, development and registration of a vaccine, and mosquito management—were instrumental in quickly reducing the annual number of equine cases from a high of 513 in 2002 to 8 in 2004. A few cases have been diagnosed each year since 2004, but vaccination has played a significant role in keeping the incidence low. A sound prevention program, which includes mosquito management is an important part of keeping the disease in check.

The Zika virus and yellow fever mosquito (*Aedes aegypti*) have captured the headlines in recent weeks. The yellow fever mosquito is not a part of Kentucky's mosquito population, and there is no indication that Zika virus affects equines. However, there are human health concerns. The larvae of this mosquito can develop in small accumulations of water (as little as 1/4 inch deep) in artificial or natural containers. It is an aggressive day biter that is most active in early morning and late afternoon. Usually, it moves only 100 to 300 yards from its breeding site, so breeding-site reduction can be an important aspect of managing this species. Repellents containing DEET are very effective at protecting people from being bitten in late August, when this mosquito is most abundant.

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