EQUINE DISEASE QUARTERLY

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IN THIS ISSUE

UK UNIVERSITY OF KENTUCKY
College of Agriculture
Department of Veterinary Science

LLOYD'S

COMMENTARY

KNOWLEDGE IS POWER. ACTUALLY, IT'S much more accurate to say "*Factual* knowledge *in context* is power."

Polymerase chain reaction (PCR) testing is an extremely sensitive test for biologic agents in horses. However, a positive PCR for *Salmonella* can indicate either the presence of live bacteria in the sample or dead bacteria with DNA still present. So, is the horse actively shedding live bacteria, or just DNA? The positive PCR test is a fact, but interpretation is everything.

Drug testing of human and animal samples for illegal substances has become extremely sensitive, in some instances detecting one part per billion of a substance. Is every positive drug test indicative of illegal drug use? The answer to this question is of obvious interest to high-caliber human athletes as well as horse owners.

Interpretation of ultra-sensitive test results has its own challenges. With the rapid advances in diagnostic testing technology in veterinary and human medicine, some people assume that test results are 100% sensitive (all positive samples are detected) and 100% specific (all negative samples are detected). However, no such test exists. In current biological diagnostic systems, some false positives and some false negatives are expected, with some procedures having 90+% sensitivity and specificity.

Even DNA testing is not 100% accurate, as the likelihood of confirming identity or paternity is dependent upon the number of DNA markers used in the test. The more markers tested, the greater the probability that two samples will match. However, probability is never 100%. Only an exclusion of identity or paternity can be made with 100% accuracy.

This doesn't mean that all diagnostic testing is worthless because of less than 100% sensitivity. Understanding of current technology—which is incredible compared to diagnostic capability of only 10 years ago and continually improving—makes diagnostic interpretation possible, and multiple tests can confirm results.

Weather forecasting is not an exact science, but horse owners have a significant interest in weather conditions. If property or animals are lost due to adverse weather events, people are affected both financially and emotionally. In addition, both fire and drought can directly affect nutrition, water supplies, and feed costs. Weather and drought predictions are based on history, facts, advanced computer modeling, and interpretation—not a crystal ball. Many people have complained about weather forecasts, but modern weather predictions for significant storms are impressive considering the difficulty of anticipating Mother Nature's tricks.

In today's world of high-speed communications, some misinformation or unverified information—even rumors—can run wild. The test of accuracy is in the reliability of the information source, understanding the overall situation, and monitoring updates for changes and corrections.

Whether it's accurate interpretation of diagnostic test results or predictions of adverse weather conditions, *Factual* information *in context* is power!

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INTERNATIONAL

First Quarter 2007

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

Contagious Equine Metritis was confirmed in one non-Thoroughbred stallion (Franches-Montagne) at the National Stud in Switzerland. Continuing the 2006 last quarter report concerning isolation of *Taylorella equigenitalis* from imported Lipizzaner stallions in Wisconsin, the USDA confirmed that the stallions, after completing two series of antibiotic treatments, cultured negative for the organism. In addition, each stallion was bred to two test mares, which also tested negative for the organism. The stallions were released from quarantine on March 7, 2007.

Cases of respiratory disease caused by equine herpesvirus (EHV) were widely reported from a variety of horse breeds in France. Horses among the Thoroughbred racing population at Sha Tin racecourse, Hong Kong, displayed fever (ranging from 101° to 103° F), which was confirmed as caused by EHV-1. Over 100 horses were affected during a period of 60 days, representing 12% of the racing population. EHV-1 was diagnosed as the cause of death in a donkey that died in the United Kingdom with severe tracheitis.

Abortions attributable to EHV-1 were reported among Standardbred mares in France. Ten cases were reported from Ireland, 14 cases on six premises from Japan, eight cases in the United Kingdom, and 14 cases in Central Kentucky, six of which occurred among vaccinated mares on one farm.

Cases of the paralytic form of EHV-1 were identified in one Thoroughbred mare reported from Japan and a Welsh Cob in the United Kingdom. Several outbreaks were reported in the United States, all characterized by low morbidity but high mortality. In January, cases were reported on two premises in Connecticut, in February in Wisconsin with two fatalities, and in New York with one fatality. Also during February, six cases with three fatalities occurred at the Marion duPont Scott Equine Medical Center, Leesburg, Virginia. The facility was closed under a state quarantine but reopened to accept equine patients at the end of March. During March, cases were diagnosed on one premise in Florida with two fatalities; in California, six cases were diagnosed with three fatalities on two premises; and in Maine, with one fatality.

A single case of coital exanthema (EHV-3) was diagnosed in a Thoroughbred stallion in the United Kingdom.

All restrictions on premises with respect to the outbreak of equine infectious anemia (EIA) in Ireland were lifted on March 21. In Italy extensive testing of the equine population for EIA is under way, with 29 positives identified during the first quarter.

Equine influenza was reported among a variety of breeds in France, and an extensive outbreak was confirmed among unvaccinated Standardbreds in training stables in Sweden. An unvaccinated Warmblood horse recently imported from Holland was confirmed as positive for influenza in the United Kingdom.

Strangles was widely reported in Ireland, and cases were reported on three premises in Switzerland among non-Thoroughbred horses.

Equine Disease Quarterly

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NATIONAL

Wildfires, Droughts, and Lightning

WILDFIRES IN THE UNITED STATES IN THE first six months of 2007 have been significant, with hundreds of thousands of acres affected in Georgia, Florida, New Jersey, Minnesota, and even Catalina Island, California. The National Interagency Wildfire Center has predicted the hot zones of wildfire risk through August (http://www.nifc.gov/nicc/predictive/outlooks/season_outlook.pdf).

While wildfires are common natural disasters in the western United States, the wildfire forecast includes all of Florida and the southern states of Mississippi, Alabama, Georgia, and South Carolina. Additionally, western North

Carolina and Virginia and portions of Alaska are at high risk.

One obvious factor is the drought conditions in many of these states. Alarmingly, the U.S. Drought Monitor (at http://www.drought.unl.edu/dm/monitor.html) showed abnormally dry conditions in wide areas of the United States as of June 1—well before the tinder dryness of later summer months.

Multiple causes for wildfires exist, some due to human factors including campfires, burning brush, smoking, fireworks, use of flares or power tools (welding, grinding, and other power tools), and outright arson. Other hazards include downed power lines, spontaneous combustion of hay and bedding, and electrical fences in contact with dried vegetation.

A natural cause for fires is lightning. The United States has more than 25 million lightning flashes per year, according to the National Weather Service. Each lightning spark can reach more than five miles, and lightning strikes can pack 50,000° F temperatures and 100 million electrical volts.

From 2000-2007, the University of Kentucky Livestock Disease Diagnostic Center (LDDC) diagnosed 101 cases of lightning strike in horses. While 88 (87%) of these cases occurred in the summer months (May through August), cases also occurred in February (1), April (4), September (7) and October (1). These figures represent only those horses brought to the LDDC for necropsy, but they suggest the monthly incidence of the lightning-associated deaths for one geographic area, since most Central Kentucky's equine necropsies are performed at the LDDC.

Droughts and lightning increase the risk of wildfires, all which have a profound impact on horses and farms. An evacuation plan is a must no matter where horse farms are, since barn fires and wildfires can occur anywhere under the right conditions.

All wildfires produce noise, heat, and smoke, which trigger panicked behavior in horses, making them challenging to handle, let alone load into a trailer. Early evacuation is therefore essential via preplanned routes and preparation.

Suggestions for horse farm owners to minimize risks are to clear back brush and low vegetation at least 30 feet from all buildings and clear leaves, branches, and other flammable materials from roofs. Trees and brush, once ignited, are more difficult to extinguish than dried grasses. Coniferous trees and some brush contain a substance called sclerophyll, which can be explosive when heated. Also, some tall ornamental grasses are extremely flammable when dry and should also be planted well away from any structure.

Continued awareness of drought conditions in the region and the status of wildfires can help in decision making.

Preparation for all types of disasters (including wildfires) involving livestock is well documented in the free online course "Livestock in Disasters" offered by the Federal Emergency Management Agency (http://training.fema.gov/IS/). General preparation guidelines for homes are available at http://www.fema.gov/.

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Figure 1. Confirmed cases of leptospira, J

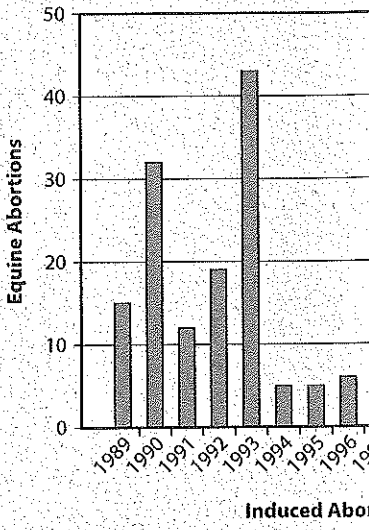
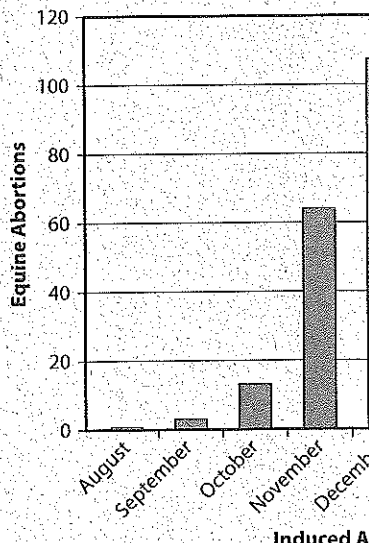


Figure 2. Confirmed cases of leptospiral-i
July 1, 1989, to April 30, 2007.



BenZoylEcgonine Thresholds in Horse Urine

IN 1985, THE KENTUCKY RACING COMMISSION directed the Equine Pharmacology program at the University of Kentucky to work on improving testing for performance-enhancing drugs. The outcome was the introduction of Enzyme-Linked-ImmunoSorbant Assay (ELISA) testing into racing. ELISA tests are exceptionally sensitive, detecting drug/drug metabolites at low parts per billion (nanograms/ml, equivalent to one second in 32 years) or high parts per trillion (picograms/ml, or one second in 32,000 years) concentrations. This high sensitivity is essential for the detection of illicit drug use in horses. However, the regulatory authorities very soon ran into the problem of these tests detecting minuscule traces of BenZoylEcgonine [BZE] in horse urine.

This is a problem because BZE is the major urinary metabolite of cocaine, which is very efficiently excreted in horse urine. Exposure to 1 mg of cocaine can yield 100 ng/ml (100 ppb) of BZE in horse urine. Since a BZE ELISA can detect 1 ng/ml or less of BZE, these tests can theoretically detect exposure of a horse to one hundredth of a milligram of cocaine.

To put this into perspective, about 300 metric tons of cocaine are imported into the United States each year, and paper currency is "highly" contaminated with cocaine. In one study on 136 one-dollar bills, 79% carried detectable cocaine, 50% carried microgram amounts, and one bill carried 1.3 mg. If 1.3 mg were given to a horse, it could easily yield a 100 ng/ml detection, which is far below that required to influence racing performance.

Reviewing these matters, Dr. C. Kolias-Baker (2002) noted that 2.5 mg of cocaine, an amount sufficient to yield detectable urinary concentrations of BZE for 24 hours, "could

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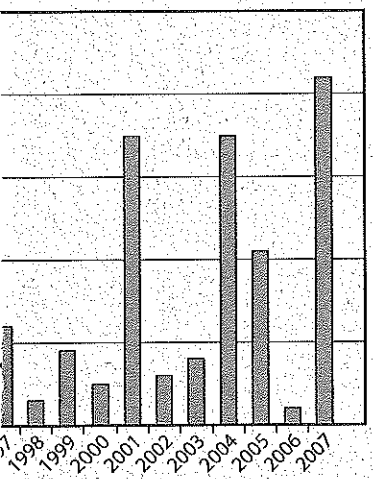
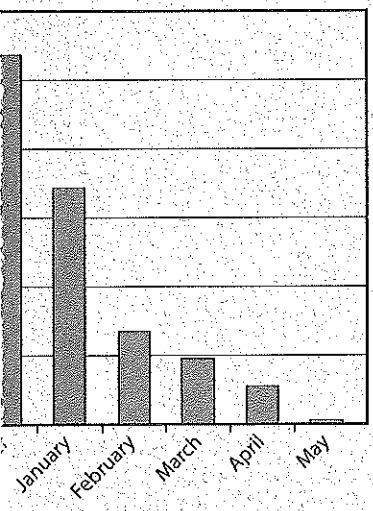


tions by Foaling Year

ıduced abortions by month,



ortions by Month

easily be transferred from a cocaine abuser's hands to the mouth or muzzle of a horse" and yield concentrations similar to those "that are occasionally found in urine samples collected from show and race horses." Similarly, Dr. Scott Waterman of the Racing Medication and Testing Consortium noted that "the presence of cocaine in a horse's blood or urine is not a sure sign that somebody is trying to fix a race, because trace amounts of cocaine could be spread by casual contact with human users" (C. Wilson, The Associated Press. 12/8/2005).

When sensitive BZE tests were introduced in California, the outcome was dramatic, and within weeks a number of California trainers, some very prominent, were associated with "trace" BZE identifications. When the dust settled, a number of important administrative changes had occurred.

The first change in California was the creation of an equine medical director position to oversee drug testing and other procedures. The second change was the introduction of thresholds, or cut-offs, for certain environmental substances in racing horses. These changes follow well-established precedents in human medicine. The equine medical director position is equivalent to a human medical review officer, and it is structured to address situations such as the multiple BZE "identifications" in California racing in the late 1980s.

The introduction of urinary cut-offs for BZE were modeled on the 150 ng/ml BZE cut-off present in human workplace drug testing. In 1999, Ohio introduced a BZE cut-off of 150 ng/ml. This threshold has since been adopted in Louisiana, Illinois, and Oklahoma, and lower cut-offs for BZE are in place in Washington state and Florida. And most recently, recognizing the regulatory implications of this problem, the U.S. Racing Medication and Testing Consortium has created an environmental contaminants subcommittee to evaluate and recommend approaches to this problem. It is chaired by Kent Stirling, executive director of the Florida Horsemen's Benevolent and Protective Association.

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KENTUCKY

Equine Leptospirosis

THE LAST REPORT OF EQUINE LEPTOSPIRAL-induced abortions was in the April 2004 issue of *Equine Disease Quarterly*. Since this report, additional cases of leptospiral-induced abortions have been diagnosed at the Livestock Disease Diagnostic Center at the University of Kentucky. For reporting purposes, a foaling year begins July 1 and ends June 30 of the subsequent year. Therefore, the following report includes cases diagnosed for the foaling years 2005, 2006, and most of 2007.

Sixty-five leptospiral-induced abortions have been diagnosed during the last three foaling years (July 1, 2005, through April 30, 2007). Breeds of horse and number of cases involved were Thoroughbred, 59; Standardbred, 5; and mixed breed, 1. Over the three-year period, the number of leptospiral-induced abortions on farms varied, with 38 farms having a single leptospiral-induced abortion, two farms having two abortions each, three farms with three abortions each, one farm with four abortions, and a single farm with 10 abortions over the three-year period.

Leptospirosis is a zoonotic bacterial disease with global distribution. Virtually all species of mammals are susceptible. The bacteria, called "spirochetes," are 6-20 microns in length, 0.1-0.2 microns in width, motile, and helically coiled. The genus is divided into multiple species and is further divided into more than 250 serovars. The term "serovar" commonly is used to describe a specific strain of *Leptospira* spp. The serovars with antigens in common are placed in serogroups for diagnostic convenience. The predominant serovar affecting horses varies with country and region. In Central Kentucky, serovars commonly affecting horses and causing infections include *L. interrogans* serogroup Pomona serovar *kennewicki* and *L. kirschneri* serogroup Grippotyphosa serovar *grippotyphosa*. Organisms from serogroup Hardjo rarely have been detected in horses in Central Kentucky.

Serologic results indicated that serovar *kennewicki* of the Pomona serogroup was responsible for 50 (77%) of the abortions and *grippotyphosa* for nine (14%) of the leptospiral-induced abortions for the past three foaling seasons. The

serovar was undetermined for six (9%) abortions. Eight (12%) of the leptospiral-induced aborted fetuses were serologically negative. Microscopic agglutination testing and the diagnosis were made via the identification of spirochetes by direct fluorescent antibody test, microscopic identification with the Warthin-Starry staining method, and/or maternal serology.

The Livestock Disease Diagnostic Center has diagnosed 315 cases of leptospiral-induced abortion in Central Kentucky over the past 19 foaling seasons. Almost all cases were due to either *kennewicki* (260 cases, 83%) or *grippotyphosa* (33 cases, 10%). Figures 1 and 2 detail, by foaling year and month, the number of confirmed cases of leptospiral-induced abortions or neonatal deaths for this period.

For additional information concerning leptospirosis in horses see Donahue, J.M. and N.M. Williams: Emergent Causes of Placentitis and Abortion. Vet Clin North Am, Equine Pract, 16: 443-455, 2000.

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Prevention and Control of Leptospirosis

Since no approved vaccine against leptospirosis in horses is available, prevention of leptospiral-induced abortion is best achieved by minimizing exposure to the bacteria. Prevention is aimed at avoiding direct contact with the urine of wildlife and cattle. Indirect contact with urine that might be present in environmental water sources, feed, and bedding should also be avoided. Practical measures that can be taken to reduce exposure to potentially urine-contaminated areas include strict control of wildlife around barns and feeding hay and grain off the ground. Other domestic species on the premises should be vaccinated against leptospirosis if an approved vaccine exists for that species. Following a leptospiral abortion, the area where the mare aborted should be thoroughly cleaned. The aborting mare should be isolated, since shedding of leptospira can continue for weeks. Antibiotic therapy can shorten the period of shedding. Serologic testing of pregnant mares can identify mares possibly at risk of aborting due to leptospirosis. High-titer mares should be isolated, and negative, or low-titer, mares should be retested in two to three weeks. A course of antibiotics in mares with high titers may prevent or lessen fetal infection and prevent abortion, although this treatment has not been evaluated in controlled studies.

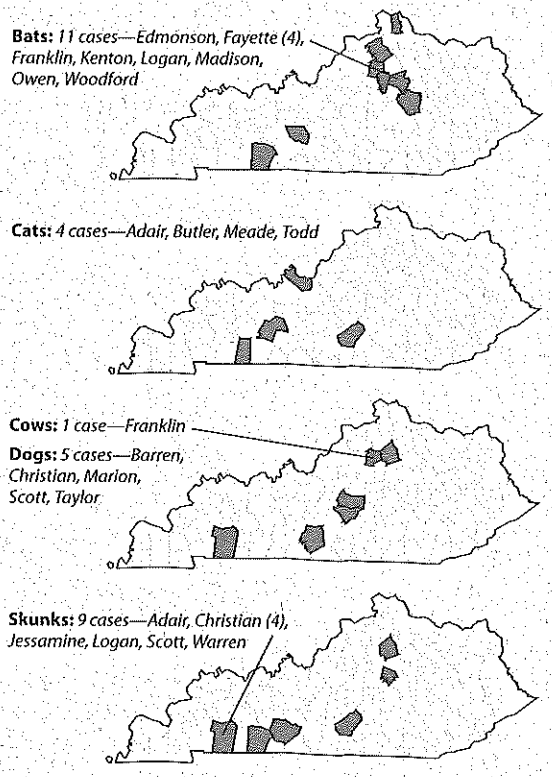
Rabies in Kentucky

IN 2006, THE KENTUCKY DEPARTMENT FOR Public Health, Division of Laboratory Services (Frankfort) and the Breathitt Veterinary Center (Hopkinsville) received 1,126 animal specimens for rabies testing. Of these, 77 (6.8%) were unsuitable for testing because of decomposition or extreme trauma to the brain. The distribution of rabies-positive animals is shown in Figure 3.

This statewide distribution of rabies cases may not be representative of the true incidence of rabies, since detection depends upon submission of proper samples to a testing laboratory. Almost all of the samples received were a result of suspicious behavior of the animal in connection with a human being or domestic animal.

Of the 1,126 animals submitted, 30 proved to be rabies positive. Of these rabid animal cases, 24 involved a bite or physical contact with a human or domestic animal. While skunk is the predominant rabies variant in Kentucky, the raccoon variant responsible for the Mid-Atlantic states' rabies epizootic is present in adjoining West Virginia and Tennessee. Multiple federal and state agencies are actively involved in preventing the spread of raccoon rabies into Kentucky.

Figure 3. Rabies Cases in Kentucky, 2006.
Kentucky Department for Public Health
Division of Epidemiology and Health Planning



2007 Update

As of May 17, 2007, seven cases of animal rabies have been confirmed in six Kentucky counties. The animals included three dogs, two horses, one bat, and one skunk. Human exposure to the rabid animals was involved in four cases (including one horse), with one animal exposure.

Domestic animal rabies cases and human exposures emphasize the need for rabies vaccination. Licensed rabies vaccines are available for horses, dogs, cats, ferrets, cattle, and sheep. Kentucky state law requires that dogs, cats, and ferrets be vaccinated against rabies by 4 months of age.

The human post-exposure rabies vaccination regimen is five doses of vaccine over 28 days plus a rabies immunoglobulin shot; no such treatment is available for unvaccinated, rabies-exposed animals. The human post-exposure series costs approximately $1,500, not including medical visits and administration. Vaccination of domestic animals, by comparison, is extremely inexpensive.

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Your Input Is Requested

Help us ensure that we are providing useful information by suggesting topics of specific interest to you. Go to http://www.ca.uky.edu/gluck/Q_survey07.asp on the Web to list equine health topics about which you would like to read and to make other comments. Then, press "submit." No postage necessary! Our goal is to provide the most up-to-date, factual information possible to the equine industry.

Equine Disease Quarterly Newsletter

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