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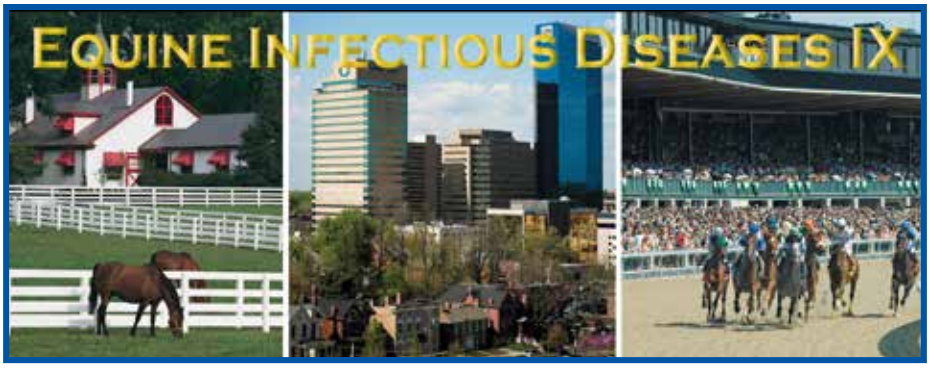
Recap: UK Gluck Center's International Conference on Equine Infectious Diseases



More than 300 attendees from 29 countries convened in Lexington in October for the ninth International Conference on Equine Infectious Diseases (EID IX), hosted by the University of Kentucky (UK) Maxwell H. Gluck Equine Research Center, a UK Ag Equine program.

The five-day conference featured plenary sessions covering infectious and parasitic diseases in the areas of respiratory disease, gastrointestinal issues, neurologic conditions, reproduction, and diseases of the working horse. Abstract presentations focused on specific disease agents, immunology, and diagnostics. Special sessions focused on emerging and re-emerging diseases, gastrointestinal parasites, and impediments to the international movement of horses. The conference also featured a practitioner's day to highlight some of the more significant findings.

To commensurate the significance of this conference, this issue of the Bluegrass Equine Digest will feature a few summaries of selected research presented at the conference.

The next meeting will be held in Buenos Aires, Argentina, in 2016.

Equine Herpesvirus-1 Myeloencephalopathy: On the Rise?

In recent years it seems owners and practitioners are increasingly confronted—both directly and indirectly—with cases of equid herpesvirus-1 myeloencephalopathy (EHM).

Lutz Goehring, DVM, MS, PhD, Dipl. ACVIM, associate professor of equine medicine at Colorado State University's College of Veterinary Medicine and Biomedical Sciences, discussed characteristics of this neurologic form of herpesvirus-1 and why it might be on the rise.

Goehring explained that this infectious disease typically spreads when one horse inhales viral particles from an infected horse. Viruses attach to the respiratory tract epithelium (lining), are transported to the lymph nodes, and then travel through the bloodstream (also known as viremia) to their specific destinations: vascular endothelial cells lining the blood vessels of the pregnant uterus, central nervous system, or eye.

Viremia typically causes a high fever and occurs prior to clinical signs of EHM. Veterinarians commonly see neurologic gait abnormalities like ataxia (incoordination), paresis (impaired movement), and dysmetria (a high-stepping gait yet limited joint movement) and bladder dysfunction, said Goehring.

A key step to preventing development of neurologic disease is to prevent endothelial cell infection. Thus, Goehring said EHM therapeutics aim to lower viremia and general viral replication using antivirals (e.g., valaciclovir) and, potentially, block endothelial cell infection using simple drugs such as non-steroidal anti-inflammatories. Goehring recommended administering these two therapies in combination on the first day a horse exhibits fever during an EHM outbreak.

As for disease prevention, "vaccination is important," said Goehring, "but it won't work alone without good husbandry and management such as separating horses and practicing good hygiene and disinfection."

In describing EHM's epidemiology, Goehring noted that its likelihood and severity differ between horse breeds, ages, and genders. He said potentially mules and definitely ponies appear less susceptible, while tall breeds such as Thoroughbreds, Quarter Horses, and Warmbloods are most susceptible. Adult horses (3 years and older) are most susceptible, while foals, weanlings, and yearlings are least susceptible. Females and aged horses that contract EHM are generally affected more severely.

Articles of Interest

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One challenging aspect of this disease is that a variable fraction of horses is latently infected (not displaying clinical signs themselves but carrying "hibernating" virus). But Goehring said "the perfect storm" is still needed for an outbreak to occur: one infected and virus-shedding horse, many horses housed close together, correct breeds and age groups, and potentially stressors that compromise immunity.

Goehring said the disease is also most prevalent from October to May. "This may be due to more indoor activity, competitions, and closed up barns (during this time of year)," he explained.

COURTESY DR. STEVE REED

Adult horses and tall breeds such as Thoroughbreds and Warmbloods are most susceptible to EHM.

But are we really seeing more EHM outbreaks? Goehring seemed to think it's possible. "Commingling of horses is the biggest risk (for disease transmission)," he said. "And there are now more competitions; bigger and longer show circuits; more large-scale boarding facilities; and a growing horse population, which helps with rapid spread of virus so that more horses are exposed during a shorter period of time."

Added to the equation are increased ways to spread news (e.g., social media) and greater media attention of EHM outbreaks. This means more people are talking about EHM outbreaks than ever before.

EPM: Update on Diagnosis, Treatment, and Prevention

Equine protozoal myeloencephalitis (EPM) is a neurologic disease of horses found throughout North, Central, and South America. It's a tricky disease to definitively diagnose and treat and, thus, has been an area of much research.

Dan Howe, PhD, a molecular parasitologist at the University of Kentucky Gluck Equine Research Center, provided veterinarians and horse owners with an update on current EPM diagnosis, treatment, prevention, and research.

Howe began with an overview of the primary causative organism's (*Sarcocystis neurona*) lifecycle. He explained that this parasite is fairly host-specific, and its major characteristic are the hallmark cysts called sarcocysts that form in intermediate host animals' (e.g., skunk, raccoon, cat, armadillo) muscle tissues.

When one of these infected animals is killed, it might get consumed by a scavenging opossum, *S. neurona*'s definitive host, in which the parasite reproduces in the intestines. When the opossum defecates in a horse's feed or water source, those same parasites can then infect the horse and sometimes invade the central nervous system.

Risk factors for EPM in horses not only include presence of opossum populations but also any factors that might cause a horse stress and, thus, impair his immune system, Howe said. *S. neurona* infection, however, does not necessarily equate to disease, he added, explaining that veterinarians and researchers see a high seroprevalence indicating exposure to the parasite (30-50%) but a low disease incidence (less than 1%) in the horse population.

"Factors influencing this might include immune competence and/or inoculum size (number of parasites the horse ingests)," Howe said.

Basic EPM research is needed to help understand parasite infection, Howe said. Currently, a whole genome sequencing project is in progress on EPM strain SN3, which he said should be a resource for discovery and characterization of *Sarcocystis* antigens and virulence factors.

Howe said that one recent EPM research development has been the discovery of SnSAGs, which are proteins covering the surface of *S. neurona* parasites that elicit a robust immune response in horses. This is significant because it presents candidates for EPM vaccine development, he noted.

Veterinarians diagnose horses with EPM based on history, clinical signs, a neurologic exam, and serologic (blood) or polymerase chain reaction (PCR) tests. Howe noted, however, that PCR tests are being used less frequently due to false negative results, and that serologic tests, such as indirect immunofluorescence antibody test (IFAT) and enzyme-linked immunosorbent assay (ELISA) tests, might be superior choices.

"However, it must be remembered that the presence of antibodies in blood indicates infection, but not disease," said Howe.

Cerebrospinal fluid (CSF) testing to detect antibodies produced in the central nervous system (CNS) is a better approach, but it is confounded by normal passive transfer of antibodies from the blood across the blood-brain barrier. "To test for CNS-produced antibodies, we need an assay that can quantify, which is why the Western blot results for CSF could be misleading," he added.

Howe said the SnSAG2, 4/3 ELISAs measure antigen-specific antibodies and are simple and straightforward, removing the risk of operator error. But again, these tests used on blood samples alone

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EPM's causative agent, *S. neurona*, can infect horses and invade their nervous systems.

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are not sufficient for disease detection.

Howe went on to describe a recent multi-investigator study evaluating 128 cases diagnosed by postmortem examination. The horses were divided into four categories based on whether they had EPM, cervical vertebral myelopathy (wobbler syndrome), another neurologic disease, or were normal.

The researchers tested paired serum and CSF samples with the SnSAG2, 4/3 ELISA to determine the most accurate method for serologic diagnosis of EPM. They concluded that serum titers alone are poor indicators of disease but that higher CSF titers are associated with EPM. They also determined that SnSAG2, 4/3 serum to CSF ratios yielded excellent diagnostic accuracy.

U.S. Food and Drug Administration-approved anticoccidial drugs for treating EPM in horses include a pyrimethamine/sulfadiazine combination (marketed as ReBalance), ponazuril (marketed as Marquis), and diclazuril (marketed as Protazil). Howe's one word of caution is that, while effective, pyrimethamine/sulfadiazine can result in bone marrow suppression and anemia in some horses.

The best treatment, however, is prevention. Howe suggested avoiding the transmission source—opossums—as best as possible. Another potential prevention method is prophylactic use of an anticoccidial drug, which Howe said could be safe and somewhat effective. He cautioned, however, that more studies are needed to determine proper dosing. He also said a preventive vaccine could be feasible, but this is a long-term proposition.

"Basic EPM research is ongoing and will help lay the foundation for future studies that can lead to development of clinical applications," Howe concluded.

He emphasized that new EPM diagnostics are available (e.g., SnSAG2, 4/3 ratios) and noted a need for additional treatment options and preventive prospects.

Equine Piroplasmosis in America: Re-Emergence and Control

Of the world's horse population, only about 10% live in countries deemed free of equine piroplasmosis (EP); the United States is one of those regions. However, recent disease outbreaks have prompted further investigation into the re-emergence and control of EP in America.

Robert Mealey, DVM, PhD, Dipl. ACVIM, associate professor of immunology and infectious diseases in the Department of Veterinary Microbiology and Pathology at the Washington State University College of Veterinary Medicine, discussed the current EP situation in the United States and recent research on the topic.

JAMES CARMALT/WWW.CDC.GOV

The pathogens that cause equine piroplasmosis are transmitted naturally via ticks.

Naturally, the pathogens that cause EP—*Theileria equi* or *Babesia caballi*—are transmitted via certain species of ticks, Mealey said. Many of the cases seen in recent years in America, however, have been spread via the reuse of needles, syringes, and other blood-contaminated equipment that has not been sanitized between uses.

"We haven't seen a lot of severe clinical disease in the United States," he added, noting that subclinical infections are much more common.

Changing gears, Mealey discussed several recent U.S. outbreaks and the suspected or confirmed modes of disease transmission.

Florida, 2008 A Florida racehorse with clinical disease tested positive for EP, and an investigation into the source of the disease found that several horses recently imported from Mexico likely carried the disease agent into the country. Investigators later determined that the likely means of transmission was the

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use of shared needles and syringes and the transfer of blood between horses.

Missouri, 2009 A similar outbreak occurred in Missouri in June 2009. The index case was a Quarter Horse racehorse; a total of eight horses were determined to be infected with EP, all of them sharing the same trainer as the index horse. Investigators believe the method of transmission of the disease agent was, again, the reusing needles and/or syringes among a group of horses and other less-than-optimal hygiene practices.

Texas, 2009 The only outbreak in recent years believed to involve natural tick-borne transmission is one that occurred on a single ranch in Texas. More than 290 of the 360 horses residing on the ranch tested positive for the disease, and a total of 413 EP cases were traced back to the ranch. Investigators learned that two types of ticks found on the ranch and on horses—the cayenne tick and the American dog tick—were capable of transmitting EP between horses.

Mealey said there were 189 cases of EP in the United States unrelated to the Texas outbreak. Of those, investigators determined that 179 were caused by *T. equi* and just 10 were caused by *B. caballi*. Some of these cases can be traced back to horses imported prior to 2005, before the newer, more sensitive test was introduced for use during import examinations.

One challenge EP presents is that it's a variable response disease, Mealey said, meaning that not all horses react in the same manner to infection. However, "treatment with the goal of parasite clearance is a reasonable approach for infected horses in the United States," he said.

One treatment option some veterinarians employ is a drug called imidocarb dipropionate (marketed as Imizol), which is labeled for use in treating babesiosis—essentially the same disease—in dogs. While there are several research papers examining the drug's method of action in horses, Mealey said, it's not completely understood. Researchers know the drug is absorbed rapidly and eliminated slowly after intramuscular injection; it has a narrow safety margin, meaning that a lethal dose isn't far from the therapeutic dose; and toxicity has occurred at the therapeutic dose. But the bottom line, Mealey said, is that imidocarb is effective in eliminating *T. equi* from the animal's system.

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Don't use an anthelmintic without knowing its efficacy against the intended parasite population.

Mealey relayed that veterinarians used imidocarb to treat 163 of the 292 horses in long-term quarantine on the Texas index ranch, and all but five tested negative for *T. equi* after one round of treatment. Those five horses were treated a second time, he added, and all tested negative after the second treatment.

Despite these encouraging results, Mealey said, more research into treating EP is needed. Ideally, researchers will be able to find or develop less toxic drugs that effectively combat the causative agents. Additionally, a vaccine might be possible in the future with additional research, he noted.

Although it's still considered a foreign animal disease, EP has made a statement in the United States in recent years. Research is under way to learn more about the disease and possible treatment methods, in hopes that the disease can once again be eradicated from the country.

Sustainable Parasite Control Do's and Don'ts

In regard to the state of equine parasite control, Martin Nielsen, DVM, PhD, EVPC, an assistant professor of equine parasitology at the University of Kentucky Gluck Equine Research Center, believes the horse industry is currently in the midst of a "revolution." With new research on parasite control and anthelmintic resistance currently taking place at a rapid rate, equine deworming recommendations are also changing.

Nielsen said the main goal of sustainable equine parasite control is to minimize disease risk associated with parasite infestations while trying to prevent said parasites from becoming resistant to all forms of dewormers.

"As parasitologists one of our commitments is to come up with the most current, evidence-based advice (for horse owners)," even if it means readdressing and revising existing recommendations, said Nielsen.

To that end, he and colleague Craig Reinemeyer, DVM, PhD, of East Tennessee Clinical Research, developed a list of key points to remember about successful sustainable equine parasite control, based on current research.

Don't use an anthelmintic without knowing its efficacy against the intended parasite population. Nielsen explained that small strongyles (cyathostomes) exhibit at least emerging resistance for all anthelmintic classes—

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benzimidazoles, tetrahydropyrimidines (pyrantel), and the macrocyclic lactones (ivermectin and moxidectin); ascarids (*Parascaris equorum*) have widespread resistance against the macrocyclic lactones; and all drugs are effective against large strongyles (*Strongylus vulgaris*). Nielsen recommended using fecal egg count reduction tests, especially on high shedders, to evaluate dewormer efficacy. Aim for a threshold of 90% efficacy for the benzimidazoles and tetrahydropyrimidines, and a 95% threshold for macrocyclic lactones.

Don't treat at fixed interval frequencies year-round. Different types and life stages of parasites flourish at different times of the year, and there are parasite seasons and off-seasons with huge differences in parasite transmission," he relayed.

Don't rotate blindly between drugs. "This is a myth that's difficult to kill," Nielsen said. "(All the research) that comes out shows rotation doesn't do squat against slowing resistance. Besides, there isn't much to rotate between since it doesn't make sense to rotate to a drug to which there is already resistance"

Don't treat adult horses during the off-season. "Adult horses should be treated during the active parasite season (i.e., grazing season) only," Nielsen said. "Treating them during winters is an unneeded use of dewormers."

Don't treat the entire herd before moving to new pasture. Anthelmintic-resistant eggs develop and are expelled via feces during and immediately after deworming of the entire herd, Nielsen said. If these resistant eggs are deposited in a clean pasture with no nonresistant parasite larvae to dilute out the resistant ones, the vast majority of the parasites horses ingest will be drug-resistant, he explained. The good old "dose and move" advice is no longer recommended.

Don't treat pregnant mares just prior to foaling. While pregnant mares can harbor potentially dangerous parasites for foals, such as ascarids, the main source of parasite infection for young horses is the environment. Additionally, there is no evidence of a periparturient rise in egg counts in foaling mares, he said. "Pregnant mares should be treated just like other adult horses," Nielsen relayed, and if this is the case, there is no real incentive for additional dewormings around foaling.

Don't treat at the first frost. "Frost doesn't kill infective strongyle larvae or eggs of the roundworm *Parascaris equorum*," Nielsen said. "When the first frost occurs, the grazing season is typically over and so is the active parasite transmission season. Treatment at this time has been associated with an increased risk of parasitic disease and could potentially accelerate the development of drug resistant worms. Rather than targeting treatments at the time of the first frost, parasite treatments should be performed well ahead of this, and the first frost should mark a time period with less intensive deworming."

Don't intentionally underdose any anthelmintic treatment. Essentially, underdosing only adds to the anthelmintic resistance problem by exposing parasites to a drug, but not at a high enough dose to kill them.

"Adult horses should be treated during the active parasite season (i.e., grazing season) only."

Dr. Martin Nielsen

Don't use formulations not labeled for horses. "We don't know how drugs not labeled for specific uses will work in the animal; it hasn't been studied," Nielsen said. "It doesn't make sense to extrapolate a ruminant dose and use it for a horse. How do you know if it works?" Additionally, he noted, dewormers labeled for other animals still contain the three classes of drugs in equine dewomers, so they likely won't do anything to combat anthelmintic resistance. Finally, Nielsen cautioned not to administer products in a different manner than they're intended to be, such as administering an injectable dewormer into an apple and giving it to the horse. "We have no idea what the plasma concentrations of the active ingredient will be, and we may very well underdose the horse," he said.

Don't use a standard treatment program for all horses in a stable. All the horses on a specific farm have different egg counts: some high, some low, and some in the middle. Therefore, each horse should be treated individually. For example, a high egg shedder will need more aggressive treatment than a low shedder. Consider implementing fecal egg counts into horses' annual veterinary care to determine just how much deworming they require.

Now that all the "don'ts" are out of the way, Nielsen said, what should owners do when it comes to deworming?

For adult horses, Nielsen recommended fecal egg counts to determine each horse's specific deworming requirements. He also recommends an annual fecal egg count reduction test to see which dewormers work on specific farms and which aren't as effective.

He suggests providing a basic treatment foundation for all horses of two yearly treatments with effective dewormers to suppress a possible resurgence of the *Strongylus* species and tapeworm. Finally, he recommended targeting high shedders more aggressively than low shedders, as determined by fecal egg count reduction tests.

Nielsen noted that owners should deworm younger horses more frequently than adult horses. He suggested the following deworming schedule:

- Two to 3 months of age: Treat horses for ascarids with a benzimidazole;
- Six months of age: Take a fecal sample to determine whether to treat for ascarids or strongyles, and then treat accordingly (he cautioned that the drugs that still work against ascarids most likely will not work against strongyles and vice versa);
- Nine months of age: Treat horses for strongyles using an efficient drug (most likely pyrantel, ivermectin, or moxidectin, he said); and
- One year of age: Treat horses for tapeworms and strongyles.

Geographic location might impact the exact deworming schedule, so consider discussing these deworming plans with a veterinarian prior to implementing one.

Coronavirus: A Cause of Enteric Disease in Adult Horses?

Although equine coronavirus is a commonly identified disease in foals—found in 27% of healthy and 29% of sick animals, according to one study—its significance as a gastrointestinal pathogen

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is still unclear. However, accumulating evidence indicates that coronavirus is associated with recent enteric disease (intestinal issues, characterized by diarrhea and fever, among other clinical signs) outbreaks in adult horses.

Ron Vin, DVM, Dipl. ACVIM, an equine practitioner at Myhre Equine Clinic in Rochester, N.H., and a consultant for IDEXX Laboratories, and Nicola Pusterla, DVM, PhD, Dipl. ACVIM, a professor in the University of California, Davis, School of Veterinary Medicine Department of Medicine and Epidemiology, both presented lectures on the topic.

Veterinarians have long suspected the relationship between coronavirus and enteric disease in foals. However, Vin relayed that a recent major outbreak in adult horses was reported in Japan in 2011. There, 132 horses, aged 2 to 4 years, residing at a draft horse racetrack that housed about 600 animals, developed fever and diarrhea that persisted for two to four days. The clinical signs were self-limiting (most cleared up in a few days), and the outbreak lasted only a few months, Vin said.

Japanese researchers were able to isolate and identify a strain of coronavirus from affected horses that was closely related to the first coronavirus strain isolated from a sick horse from North Carolina.

Five separate coronavirus outbreaks occurred at boarding stables in the United States from November 2011 to August 2012. Pusterla reported that the outbreaks—which occurred in California, Texas, Wisconsin, and Massachusetts—involved mainly adult horses ranging in age from 1 year to 39 years. A total of 75 horses (12 to 16 at each premises) developed clinical signs during the outbreaks. Sporadically, additional cases were reported from 11 states, Vin said.

Pusterla relayed that the most commonly reported clinical signs associated with the outbreak included anorexia in 65 horses, lethargy in 58 horses, and fever in 43 horses. Less common clinical signs included changes in fecal character and colic, he said.

In most cases, Pusterla relayed, clinical signs resolved in one to four days when horses received supportive care; however, four horses located at three farms died or were euthanized due to the rapid progression of clinical signs, he said.

"The cause of death could not be determined with necropsy evaluation in two horses, while septicemia secondary to gastrointestinal translocation was suspected in two horses," he said.

Vin relayed that researchers who were able to isolate the virus from fecal samples from Washington and Idaho found the strain affecting those horses was 99% similar to the initial North Carolina strain.

Pusterla relayed that in conjunction with the outbreaks, he and colleagues validated real-time PCR (polymerase chain reaction) test to identify the virus in feces. Pusterla tested fecal samples from 44 horses with clinical signs of disease and 99 apparently healthy horses. Of those, 34 affected horses tested positive for coronavirus via PCR, while 89 healthy horses tested negative.

He concluded that PCR is a "sensitive and fast diagnostic tool to document the presence of coronavirus in feces from horses with unspecified clinical signs."

Similarly, in his presentation, Vin discussed the use of a commercially available diarrhea panel to identify the presence of coronavirus—along with several other pathogens—in horses' feces. Of 560 horses older than a year tested with the panel, 35 were positive for coronavirus. Of those that tested positive, 16 samples came from horses involved with outbreaks.

Vin believes that coronavirus isn't likely to be an incidental finding in diarrhea panels and should be considered a significant pathogen in adult equine enteric pyrexic disease. Both he and Pusterla noted they believe more research and additional studies are needed to further the collective understanding of coronavirus' role in adult horses. UK

>Alexandra Beckstett, associate managing editor at *The Horse: Your Guide to Equine Health Care*; Jenny Evans, Gluck Equine Research Foundation coordinator at the Gluck Center; and Erica Larson, news editor at TheHorse.com, contributed to this recap.

UK Researcher Evaluates Uses for Anti-Müllerian Hormone Testing

Is your mare behaving more (night)marish lately, or is your gelding acting studly? Before recruiting a behaviorist or administering medication, experts advise ruling out medical issues for any animal experiencing behavior problems.

"A number of conditions can cause hormonal imbalances in horses of either sex that affects their behavior," said Barry A. Ball, DVM, PhD, Dipl. ACT, the Albert G. Clay Endowed Chair in Equine Reproduction at the University of Kentucky's Maxwell H. Gluck Equine Research Center.

The problem with diagnosing hormonal imbalances is that many tests are not accurate or sensitive enough to detect small changes in blood levels of certain hormones. Also, many hormone levels fluctuate (in a cyclic manner), depending on time of day and/or season. To date, practitioners have used testosterone, inhibin, progesterone, and estrogenlike hormones to help diagnose ovarian tumors in mares and/or cryptorchidism (undescended testicles).

"Inhibin and testosterone are not ideal because both may be elevated normally during pregnancy in the mare, and pregnancy must be excluded in order to interpret their values," Ball said.

Likewise, using testosterone to detect a retained testis in a "gelding" might require multiple blood samples and possibly a stimulation test involving another hormone, human chorionic gonadotropin.

Ball and colleagues, attempting to find a better hormone test, ultimately "borrowed" a human hormone assay to measure anti-Müllerian hormone (AMH). The researchers used the AMH assay in mares with ovarian tumors and in male horses (stallions, geldings, and cryptorchids).

> **The researchers used the AMH assay in mares with ovarian tumors and in male horses.**

In their studies they determined that one of the most beneficial uses for AMH is for testing geldings with questionable castration history to determine if they are cryptorchids.

"One study demonstrated that traditional testosterone tests for cryptorchids yielded inconclusive results in 14% cases tested," Ball relayed.

AMH, which is produced by specific cells inside testicles, can be detected in a single blood sample. Ball and colleagues from the University of California, Davis, Veterinary Medical Teaching Hospital's Clinical Endocrinology Laboratory found that AMH concentrations were significantly higher in cryptorchids (n=44) than intact stallions (n=15) and geldings (n=48).

"This data support the use of AMH to detect testicular tissue in horses with questionable castration history," Ball added. "Unlike some tests for cryptorchids, AMH requires only a single blood sample."

Ball's team also evaluated using the AMH test in mares with granulose cell tumors (GCT), the most common type of ovarian tumor. Although mostly benign, GCTs can prevent pregnancy and cause stallionlike behavior and other problems in mares. GCTs can be palpated on rectal examination, but hormone testing for a definitive diagnosis is recommended.

Granulosa cells of the ovaries produce AMH; thus, Ball et al. collected blood samples from mares diagnosed with GCTs as well as normal mares to determine if the human AMH test could be employed in mares. The discovered that mares with confirmed GCTs had significantly higher AMH levels than normal (cyclic) mares, pregnant mares, and ovariectomized mares (those without ovaries). Further, they found AMH to be a more sensitive test (i.e., correctly identifies mares with GCTs) than inhibin, testosterone, and a combination of inhibin/testosterone testing.

Another application of AMH testing Ball explored is assessing "follicular reserve" in broodmares.

"Mares only have a certain number of ovarian follicles when they are born," Ball said. "Once the follicular supply is depleted, a mare will no longer be able to become pregnant. Having a test that can determine if a mare has a low follicular reserve could identify which mares might have a shorted reproductive lifespan."

In their research, Ball and colleagues found significantly higher AMH blood levels in young mares (3-15 years) than older mares (16-31 years). In addition, they noted a positive association between the follicle counts (determined via ultrasonography) and AMH concentration.

Research in this field is ongoing and, according to Ball, the AMH test will be available in the near future through Minitube of America Inc., in Verona, Wisc.

>Stacey Oke, DVM, MSc, is a freelance medical writer based out of Canada.

UK Ag Equine Programs to Host Equine Showcase, Breeders' Short Course

University of Kentucky (UK) Ag Equine Programs will host the UK Equine Showcase and the 4th Annual Kentucky Breeders' Short Course Jan. 18-19 at the UK Veterinary Diagnostic Laboratory located at 1490 Bull Lea Road, in Lexington.

The second annual UK Equine Showcase will highlight the university's current equine programs and relevant industry findings. It will run from 1-5 p.m. on Jan. 18, with a light reception following. The 4th Annual Kentucky Breeders' Short Course is an in-depth program on equine reproduction and horse management from 8 a.m. to 5 p.m. on Jan. 19, with lunch provided.

"The UK Equine Showcase is a great opportunity for those in the industry to learn about the latest equine research and education efforts at the University of Kentucky," said Ed Squires, PhD, Dipl. ACT (hon.), director of UK Ag Equine Programs and the Gluck Equine Research Foundation. "The annual Kentucky Breeders' Short Course will focus on equine reproductive efficiency and horse management issues. UK is fortunate to have many experts in equine science who can serve as speakers."

Topics and speakers for the UK Equine Showcase include:

- Inflammatory markers and whether they can predict fitness and impending injury; David Horohov, PhD, Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Center
- Novel therapies for equine metabolic

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syndrome and if they work; Amanda Adams, PhD, an assistant research professor at the Gluck Center

- Effect of antibiotics on gastrointestinal bacteria; Laurie Lawrence, PhD, professor in the department of animal and food sciences at UK
- Wobbler syndrome, what is known and remaining questions; Jennifer Janes, DVM, PhD, postdoctoral scholar in the UK Department of Veterinary Science
- Beyond deworming: controlling parasites in a horse's environment; Mary Rossano, PhD, assistant professor in the department of animal and food sciences at UK
- Kentucky equine survey: preliminary results from Kentucky's first statewide equine survey in 35 years; Jill Stowe, PhD, associate professor in agricultural economics at UK
- Understanding coat color genetics; Kathryn Graves, PhD, director of the Animal Genetic Testing & Research Laboratory
- Insuring land is available for future equine uses; Lori Garkovich, PhD, professor in the department of community leadership development at UK

Topics and speakers for the Kentucky Breeders' Short Course include:

- A look at what happens when sperm meets egg; Mats Troedsson, DVM, PhD, Dipl. ACT, director of the Gluck Center and chair of the department of veterinary science at UK
- Hormonal use in mares; Squires
- Ovarian problems in mares; Barry Ball, DVM, PhD, Dipl. ACT, Albert G. Clay Endowed Chair in Equine Reproduction at the Gluck Center
- A look at how to treat uterine infection in mares; Troedsson
- Cutting feed costs without cutting corners: tips for more economical feeding programs; Lawrence
- Evaluating and maintaining pastures; Ray Smith, PhD, professor and forage extension specialist at UK
- Mud, erosion, and composting; Steve Higgins, PhD, director of environmental compliance for the UK Agricultural Experiment Station
- Control of sexual behavior in stallions; Squires
- Nutritional management of the stallion; Lawrence
- Cases of poisoning in horses; Cynthia Gaskill, DVM, PhD, clinical veterinary toxicologist at the UK Veterinary Diagnostic Laboratory

Both programs are open to veterinarians, horse owners, and managers of all breeds or anyone with an interest in equine reproduction and horse management. Continuing education credit for veterinarians and veterinary technicians is pending approval by the Kentucky Board of Veterinary Examiners.

To register, visit http://ukequineshowcase.eventbrite.com. Early bird registration rates for the UK Equine Showcase are $50 per person, or $40 when two or more people from the same organization register at the same time. Early registration rates for the Kentucky Breeders' Short Course are $100 per person, or $90 when two or more people register at the same time. Attendees can attend both days for $125 per person, or $115 when two or more people from the same organization register. Prices increase after Jan. 4. Students are eligible for a reduced rate, but student-designated space is limited and on a first-requested, first-served basis. UK students or faculty interested in attending should e-mail jenny.blandford@uky.edu. Find more information about this event and other UK Ag Equine Programs at www.ca.uky.edu/equine. UK

>Holly Wiemers, MA, is the communications director of the UK Ag Equine Programs.

UPCOMING EVENTS

Jan. 18

UK Ag Equine Programs will host the University of Kentucky Equine Showcase, 1-5:30 p.m., UK Veterinary Diagnostic Laboratory. To register, visit http://ukequineshowcase.eventbrite.com.

Jan. 19

4th Annual Kentucky Breeders' Short Course, 8 a.m.-5 p.m., UK Veterinary Diagnostic Laboratory. To register, visit http://ukequineshowcase.eventbrite.com.

Feb. 2

Kentucky Roundup, all day, Kentucky Horse Park.

The Kentucky Horse Council and area horsemen are teaming up with supporting businesses to offer a day of fun, education, and entertainment to introduce Kentucky children to the wonder of horses. Activities include live horse demonstrations, clinics, kids corral, educational classes, an international safety symposium, and exhibitors and vendors. To help add to the event's excitement and entertainment, the evening will conclude with a concert by John Michael Montgomery, an acclaimed country and western singer with Kentucky roots. For tickets and more information, visit www.kentuckyroundup.com.

Lloyd's of London

Lloyd's of London presented a check to the University of Kentucky (UK) on Dec. 20 to mark its more than $1 million contribution to UK over the past 20 years—specifically, to fund the Maxwell H. Gluck Equine Research Center's print and online publication, the Equine Disease Quarterly. Pictured (from left to right): Mats Troedsson, DVM, PhD, Dipl. ACT, director of the Gluck Center and chair of the Department of Veterinary Science at UK; Patrick Talley, United States central region director of Lloyd's America; UK President Eli Capilouto, PhD; Roberta Dwyer, DVM, MS, Dipl. ACVPM, a professor in the Department of Veterinary Science at UK; Peter Timoney, MVB, PhD, FRCVS, Frederick Van Lennep Chair in equine veterinary science at the Gluck Center; and Ed Squires, PhD, Dipl. ACT (hon.), director of UK Ag Equine Programs and executive director of the UK Gluck Equine Research Foundation.


2013 Equine Showcase & Breeders' Short Course
Join the University of Kentucky for two events on two days with 15 top equine researchers.
January 18
UK Equine Showcase
A program highlighting the university's current equine programs and findings relevant to the industry.
January 19
4th Annual Kentucky Breeders' Short Course
An in-depth program on equine reproduction and horse management issues.
UKAg EQUINE UNIVERSITY OF KENTUCKY
Location: UK Veterinary Diagnostic Laboratory Auditorium 1490 Bull Lea Rd, Lexington
Registration: http://ukequineshowcase.eventbrite.com
Web: www.ca.uky.edu/equine
E-mail: equine@uky.edu
Find us on Facebook!

UK Equine Showcase

12:30 p.m.	*Registration*
1-1:30	**Can inflammatory markers predict fitness and impending injury?** David Horohov, PhD, Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Equine Research Center
1:30-2	**Novel therapies for Equine Metabolic Syndrome: Do they work?** Amanda Adams, PhD, assistant research professor at the Gluck Equine Research Center
2-2:30	**Effect of antibiotics on gastrointestinal bacteria.** Laurie Lawrence, PhD, professor in the Department of Animal and Food Sciences at UK
2:30-3	**Wobbler Syndrome: What we know and remaining questions.** Jennifer Janes, DVM, a PhD student at the Gluck Equine Research Center
3-3:30	*Break*
3:30-4	**Beyond deworming: Controlling parasites in your horses' environment.** Mary Rossano, PhD, assistant professor in the Department of Animal and Food Sciences at UK
4-4:30	**Kentucky Equine Survey, phase 1 results: Inventory, income, expenditures and assets.** Jill Stowe, PhD, associate professor in the Department of Agricultural Economics at UK
4:30-5	**Why is my horse that color?** Understanding coat color genetics. Kathryn Graves, PhD, director of the Animal Genetic Testing and Research Laboratory at UK
5-5:30	**Ensuring land is available for future equine uses.** Lori Garkovich, PhD, professor in the Department of Community Leadership Development at UK

4th Annual Kentucky Breeders' Short Course

7:30 a.m.	*Registration*
8 - 8:30	**What happens when sperm meets egg?** Mats Troedsson, DVM, PhD, Dipl. ACT, director of the Gluck Equine Research Center and chair of the Department of Veterinary Science at UK
8:30 - 9:15	**Hormonal use in mares.** Ed Squires, PhD, Dipl. ACT (hon.), director of UK Ag Equine Programs and executive director of the UK Gluck Equine Research Foundation
9:15 - 10	**Ovarian problems in mares.** Barry Ball, DVM, PhD, Dipl. ACT, Albert G. Clay Endowed Chair in Equine Reproduction and professor in the Department of Veterinary Science at the Gluck Equine Research Center
10 - 10:15	*Break*
10:15 - 11	**How do you treat uterine infection in mares?** Mats Troedsson, DVM, PhD, Dipl. ACT, director of the Gluck Equine Research Center and chair of the Department of Veterinary Science at UK
11 - 11:45	**Cutting feed costs without cutting corners: Tips for more economical feeding programs.** Laurie Lawrence, PhD, professor in the Department of Animal and Food Sciences at UK
11:45 - 12:30	**Evaluating and maintaining your pasture.** Ray Smith, PhD, professor and forage extension specialist in the Department of Plant and Soil Sciences at UK
12:30 - 1:30	*Catered lunch*
1:30 - 2:15	**Mud, erosion and composting.** Steve Higgins, PhD, director of environmental compliance for the Kentucky Agricultural Experiment Station
2:15 - 3	**Control of sexual behavior in stallions.** Ed Squires, PhD, Dipl. ACT (hon.), director of UK Ag Equine Programs and executive director of the UK Gluck Equine Research Foundation
3 - 3:15	*Break*
3:15 - 4	**Nutritional management of the stallion.** Laurie Lawrence, PhD, professor in the Department of Animal and Food Sciences at UK
4 - 4:45	**Cases of poisoning in horses.** Cynthia Gaskill, DVM, PhD, clinical veterinary toxicologist at the UK Veterinary Diagnostic Laboratory
4:45 - 5:15	*Question and answer session with all speakers.*