Three inducted into Equine Research Hall of Fame

The University of Kentucky Gluck Equine Research Foundation inducted three scientists into the UK Equine Research Hall of Fame Sept. 23 at Keeneland Race Course.

George Allen, a posthumous inductee formerly of UK’s Gluck Equine Research Center, Eugene Lyons of UK’s Gluck Equine Research Center and Stephanie Valberg of the University of Minnesota were selected for their contributions to equine science and research. Nominated by their peers and colleagues, the three individuals were selected by past Hall of Fame inductees.

“On behalf of the Gluck Equine Research Foundation board, I would like to congratulate this year’s inductees,” said Walter Zent, chairman of the foundation’s board of directors. “We were fortunate to have many excellent nominees who have dedicated their lives to equine research.”

Allen joined the UK Department of Veterinary Science faculty in 1978 and remained there until his death in 2008. Among Allen’s most important accomplishments are a better understanding of the origination and development of equine herpesvirus-1 (EHV-1) pathogenesis, his findings about the importance of cytotoxic T lymphocytes in preventing and controlling EHV-1 infection, development of an equine model for neurological disease caused by EHV-1 and the identification of risk factors for the development of this particular syndrome.

Gluck Center hosts International Conference on Equine Infectious Diseases

The University of Kentucky Maxwell H. Gluck Equine Research Center hosted the 9th International Conference on Equine Infectious Diseases (EID IX) Oct. 21-26, 2012 at the Hilton Lexington/Downtown Hotel. This is the second time this conference was held in Lexington. The fifth conference was hosted by UK in 1987 to mark the official opening of the Gluck Center 25 years ago.

The five-day conference featured plenary sessions covering infectious and parasitic diseases in the areas of emerging, respiratory, gastrointestinal, neurological, reproduction and diseases of the working horse. There was also abstract presentations on specific disease agents, immunology, diagnostistics and special sessions focusing on gastrointestinal parasites and impediments to the international movement of horses.

The conference featured a practitioner’s day Oct. 21 for equine veterinarians or anyone interested in equine infectious diseases, and highlighted some of the more significant findings presented at the conference.

“The 9th International Conference on Equine Infectious Diseases provided a unique opportunity for equine scientists and veterinarians from around the world to meet and discuss recent advances and ongoing challenges,” said local organizing chair David Horohov, PhD, Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Center. “This conference provide a worldwide perspective on many of these issues and help to identify areas of urgent need for future research. We also heard about recent advances in the diagnosis, treatment and prevention of these diseases.”

About the Gluck Equine Research Foundation

The mission of the Gluck Equine Research Center is scientific discovery, education and dissemination of knowledge for the benefit of the health and well-being of horses.
I would like to thank everyone that was involved in the 25th anniversary celebration of the Maxwell H. Gluck Equine Research Center on September 23rd, 24th and 25th. We opened the three-day celebration with the induction of three new members into the University of Kentucky Equine Research Hall of Fame, followed by the 12th Mary Passenger Memorial Lecture on Equine Medicine and Surgery on the 24th, and finally, an anniversary luncheon on the 25th.

In spite of uncooperative weather conditions that forced us to make a last-minute modification of the program and, with short notice, change the location for the lunch, the day ended up as a great success. This achievement should be credited in its entirety to our committed staff and students that helped the excellent UK catering staff to adjust to the unwillingness of Mother Nature to cooperate. It also serves as a good example of the remarkable commitment and devotion among our staff at the Gluck Center. Whatever the challenge they are presented with, there is always a solution to be found and no time wasted to find a solution!

Speakers at the 25th anniversary luncheon included University of Kentucky President, Dr. Eli Capilouto; College of Agriculture Dean, Dr. Scott Smith; former Chair of the Gluck Equine Research Foundation, Dr. Steve Conboy; present Chair of the Foundation, Dr. Walter Zent; and former Director of the Gluck Center, Dr. Peter Timoney. A common theme of the presentations was an emphasis of the value the Gluck Center has brought to veterinarians, horse owners and managers in Kentucky, and how research at the Gluck Center has contributed to the health and well-being of horses around the world. We have obviously had a successful period of 25 years to look back on, and we are prepared to meet some of the same, as well as new, challenges during the next 25 years.

At 25, the Gluck Equine Research Center is an established world-class equine research institution with some of the most talented scientists and students in the world. With future support from individuals and organizations within the horse community, I have no doubt that we can grow even stronger and serve the horse community and the veterinary profession well in the near and long term future. In order to further establish the Gluck Center as a world-leading equine research institution, we have developed strategic partnerships with research institutions in the U.S. and Europe. This will allow us to draw from expertise and strengths outside the Gluck Center, and add valuable resources to efficiently solve equine health problems as well as scientific discoveries that require substantial human and capital investments. After all, we have a common goal to improve the health and well-being of horses.

The Gluck Center is both willing and capable of leading the way by bringing the expertise of equine researchers together in a new era of biomedical research. In this pursuit, it is necessary to maintain and further build upon the unique partnership and trust we have established with the horse industry. Without your financial support, none of this could have been accomplished.

Thank you faculty, staff and students at the Gluck Center for your strong commitment and outstanding work. Thank you to all individuals and organizations that have supported us financially. And, thank you to the leadership at the University of Kentucky for your contribution to our past and future success.

Dr. Mats Troedsson, DVM, PhD, Dipl. ACT
Gluck Equine Research Center Director
and Department of Veterinary Science Chair
M.Troedsson@uky.edu
George Allen was a truly dedicated, highly creative and accomplished scientist whose contributions to the field of equine herpes virology were unmatched throughout his highly productive career in equine research,” said Peter Timoney, Frederick Van Lennep Chair in Equine Veterinary Science at the Gluck Equine Research Center.

Lyons joined the faculty in the UK Department of Veterinary Science in 1963. In his more than 45-year career, Lyons’ work continues to attract interest in the field of equine helminth infections. He was the first to demonstrate the transmission of helminth parasites in milk of mother seals to their offspring; this observation was later extended to a number of equine helminth infections and altered current thinking on the epidemiology of different endoparasitic diseases of the horse. Lyons is also recognized for the importance of his contributions to the field of acquired resistance of small roundworm infections in the horse to various anthelmintic drugs.

“This is a great, and I personally feel, an undeserved honor for myself alone. It is unfortunate that the other team members, Sharon Tolliver and Sandra Collins, cannot be included as co-awardees,” Lyons said.

Valberg, director of the University of Minnesota’s Equine Center, established the Neuromuscular Diagnostic Laboratory at U of M, which receives muscle biopsy submissions from horses around the world. Valberg has been a pioneer in unraveling the mystery of tying up and other muscle disorders in horses. Through her research, previously unknown muscle disorders were discovered, their genetic basis identified and nutritional strategies developed to minimize muscle pain. Her work in equine myopathies has revolutionized equine practice.

“I am honored to be among such distinguished scientists in the Hall of Fame. My research has been fueled by a passion for horses, by the wisdom of colleagues such as Dr. Jim Mickelson and the hard work of terrific graduate students,” Valberg said.

Equine Research Hall of Fame nominees can be living or deceased, active or retired in the field of equine research. Established in 1990, the Equine Research Hall of Fame honors international scientific community members biennially who have made equine research a key part of their careers, recognizing their work, dedication and achievements in equine research.


Jenny Evans is the Gluck Equine Research Foundation Coordinator at the Gluck Center.
UK to host *Lawsonia intracellularis* symposium

The University of Kentucky Department of Veterinary Science will host the *Lawsonia intracellularis* and equine proliferative enteropathy symposium on Nov. 15 at the University of Kentucky Veterinary Diagnostic Laboratory.

The *Lawsonia intracellularis* and equine proliferative enteropathy symposium will offer an in-depth look at the latest information on the bacterium and the disease it causes in horses. The event is targeted toward veterinarians and anyone else with an interest in learning more about *L. intracellularis* and equine proliferative enteropathy.

Four hours of Continuing Education has been approved by the Kentucky Board of Veterinary Examiners for veterinarians and veterinary technicians. CE sheets must be signed at the meeting to receive credit.

Cost of the symposium is $50. Those interested in attending should sign up at www.epesymposium.eventbrite.com as space is limited.

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**Symposium**

*Lawsonia intracellularis* and Equine Proliferative Enteropathy

University of Kentucky Veterinary Diagnostic Laboratory
1490 Bull Lea Road • Lexington, KY 40511

November 15, 2012
1:00 - 5:30 p.m.*

Hosted by the Gluck Equine Research Center and Veterinary Diagnostic Laboratory—two UK Ag Equine Programs—the *Lawsonia intracellularis* and Equine Proliferative Enteropathy Symposium will offer an in-depth look at the latest information on the bacterium and the disease it causes in horses. The event is targeted toward veterinarians and anyone else with an interest in learning more about *L. intracellularis* and equine proliferative enteropathy.

Register early at: www.epesymposium.eventbrite.com
(Space is limited.)

Registration deadline is November 8.

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**A UK Ag Equine Program**

Four hours of Continuing Education has been applied for with the Kentucky Board of Veterinary Examiners for veterinarians and veterinary technicians. CE sheets must be signed at the meeting to receive credit.

**Welcome and Introductions by:**

Dr. David Horohov, PhD, William Robert Mills Chair in Equine Immunology at the 
UK Gluck Equine Research Center

Dr. Ed Squires, PhD, Dipl. ACT (hon.), Director of UK Ag Equine Programs, and 
Executive Director of the UK Gluck Equine Research Foundation

**Sessions include:**

*Background and history of L. intracellularis, especially in pigs and horses, and available diagnostic tests*

Dr. Connie Gebhart, PhD, Assistant Professor in the Department of Veterinary 
and Biomedical Sciences at the University of Minnesota

*Typical presentation, clinical signs, treatment, prevention, and case reports*

Dr. Nathan Slovis, DVM, DACVIM, CHT, Director of the McGee Center at 
Harvard Equine Medical Institute

*Immunology—weanlings and EPE*

Dr. David Horohov, PhD, William Robert Mills Chair in Equine Immunology at the 
UK Gluck Equine Research Center

*Pathology—typical necropsy findings and newly reported necrotizing EPE*

Dr. Alan Lomnachan, DVM, PhD, Dipl. ACVP, Assistant Professor at the UK 
Veterinary Diagnostic Laboratory

*Screening for L. intracellularis in horses*

Dr. Allen Page, DVM, a PhD candidate at the UK Gluck Equine Research 
Center

*Group Discussion:*

*Future research directions and imperatives*

Cocktail reception with hors d’oeuvres follows from 5:30 to 7:30 p.m.
Central Kentucky Thoroughbred farms participate in *Lawsonia intracellularis* study

Allen Page, DVM, a PhD student at the University of Kentucky Gluck Equine Research Center, is conducting a study on *Lawsonia intracellularis* which involved 14 Thoroughbred farms and 600 Thoroughbreds in Central Kentucky.

*L. intracellularis* is a bacterium that causes equine proliferative enteropathy (EPE), an emerging intestinal disease of horses that primarily affects weanling foals 4 to 7 months old.

Page began the *L. intracellularis* study in January with a goal of determining the role of maternal antibodies in infection and immunity to *L. intracellularis*. The study will be complete in February 2013.

Blood samples from the mares and foals are collected by the farm at the time of the foal’s birth. After that period, only blood samples from the foal are collected monthly. This is to monitor the decline in maternal antibodies in the foal’s circulation.

“These farms are participating, because they realize how much this research will benefit the industry,” Page said. “One of the benefits of conducting research at the Gluck Center is access to the farms around us, and how most of them are willing to help with research projects dealing with important and emerging issues.”

Page said he is grateful for the farms who are participating due to the extra work required during the study and expects the outcome will benefit the industry as a whole.

Gluck Center develops new PCR assay for EHV-1

Kathryn Smith, a graduate student in Udeni Balasuriya’s, PhD, MS, BVSc, professor at the Gluck Equine Research Center, laboratory has developed and validated a new real-time Polymerase Chain Reaction (PCR) assay. This assay can detect and discriminate between neuropathogenic and non-neuropathogenic equine herpesvirus-1 (EHV-1) strains in nasal swab samples.

All EHV-1 strains can potentially induce respiratory disease as well as abortion in mares, but only specific neuropathogenic strains can cause large scale outbreaks of neurological disease. Several years ago, a single nucleotide mutation in viral DNA polymerase encoding gene (open reading frame 30 [ORF30]) has been linked to the neuropathogenic type of EHV-1. Identification of this particular mutation led to the development of a real-time PCR assay (E2) to diagnose EHV-1 infection in horses by the late George Allen, PhD, at the Gluck Center. The PCR assay (E2) distinguishes between potential neuropathogenic (causing or capable of causing disease of nervous tissue) and non-neuropathogenic EHV-1 strains and identifies any viral DNA in the horse’s nasal secretion revealing an active virus shedding. However, the assay was found to yield false negative results, and thus, the sensitivity was not as high as desired for the detection of low amounts of virus particles in clinical samples.

“Now we have developed and validated an improved and more reliable new real-time PCR assay for diagnosing EHV-1,” Balasuriya said.

The new and improved real-time PCR assay (E1) has been evaluated and compared to E2 assay using 76 archived EHV-1 isolates and 433 clinical specimens from cases of suspected EHV-1 infection. The new assay (E1) has been developed by redesigning new primers and probes to detect and differentiate neuropathogenic and non-neuropathogenic strains of EHV-1, said Balasuriya.

According to Balasuriya, the E1 is 10 times more sensitive than E2, and can detect down to 10 virus particles in one sample. The comparisons of the two tests indicate that E2 lacks adequate sensitivity for routine diagnostic applications and consequently generates more false negative results.

“If we show maternal antibodies do play a role in protection against *L. intracellularis*, there is a potential to administer hyperimmune plasma much like we do for *Rhodococcus equi* (a pulmonary disease in foals which causes abscesses to form in the lungs),” Page said. “If the antibodies are not important in immunity to *L. intracellularis*, then it’ll allow us to look at other aspects of foal and weaning immunity that would suggest why horses in these age groups are uniquely susceptible to the bacterium.”

Page, who is funded by the Pfizer Animal Health-Morris Animal Foundation (MAF) Veterinary Fellowship for Advanced Study and the Mt. Brilliant Family Foundation, is mentored by David Horohov, PhD, Jes E. and Clementine M. Schlaikjer Endowed Chair at the Gluck Center.

The *L. intracellularis* study is funded by the Morris Animal Foundation.

*Jenny Evans is the Foundation Coordinator at the Gluck Equine Research Center.*

Infectious Diseases and Immunology

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*Jenny Evans is the Foundation Coordinator at the Gluck Equine Research Center.*

Gluck Center develops new PCR assay for EHV-1

“Of all the infectious viral diseases, EHV-1 is the one considered to be the most costly to the equine industry giving rise to large-scale outbreaks and losses every year. EHV-1 can cause a variety of symptoms, including acute upper respiratory disease with fever, abortion and neurologic disease. Most horses have been exposed to EHV-1 early in life and consequently establish a latent infection, sporadically shed virus, or exhibit only a few clinical signs. They become silent carriers showing no clinical signs of illness, but can potentially cause new infections in foals and young horses. What makes EHV-1 tricky is the unique ability of the virus to stay dormant and reappear later when stressed horses may shed infectious virus particles.”

*Shaila Sigsgaard is a contributing writer.*
Practical biosecurity for horse farms

It can be a challenge to reduce the risks of potential infectious disease outbreaks, but farm owners can do a few things to minimize introduction and spread of infectious diseases, said Roberta Dwyer, DVM, MS, Dipl. ACVPM, a professor in the department of veterinary science at the University of Kentucky. One golden rule is to keep track of traffic control, education and clean environment.

Vaccination is an important, but not an entirely 100% effective, safety measure, Dwyer said. Therefore horse owners should work with their veterinarian and staff to create a biosecurity plan and vaccination program for their farm. Biosecurity is a set of control measures designed to break the cycle and reduce the spread of infectious diseases. Farm owners need to do what they can to reduce the risk of infectious diseases being introduced to their farm and spread by both humans and horses, Dwyer said. A biosecurity plan should include fly, rodent, bird, and pest control and prevention, as well as traffic control on the farm.

Causess of equine disease outbreaks include rotavirus, Salmonella, equine herpesvirus, equine influenza, equine arteritis virus, rhinoviruses, Streptococcus equi, and Rhodococcus equi. Of the bacterial and viral pathogens which infect horses, clostridial organisms are some of the most difficult to kill.

“Be careful when you read social media—always get information confirmed to avoid panic and misinformation,” Dwyer said.

According to Dwyer, horses with a nasal discharge, cough, fever, or diarrhea should instantly be isolated from other horses and the farm veterinarian consulted. The stalls or barns housing the sick horses should be disinfected.

“Isolate sick, new, and horses returning from a show or event in the barn for approximately two weeks to help reduce the risk of them introducing an infectious disease to the resident horses,” Dwyer said.

Muck out the stalls of sick horses last and avoid spreading the infected manure or bedding on fields. Protective clothing and disposable gloves are helpful to stop the spread of contagious diseases between horses and people too, Dwyer said.

Because some of the potential sources of contaminations are traffic between barns and horses, as in the instances of horses returning from racing, showing, veterinary hospitals, etc., traffic control is highly recommended.

Quarantine is another central measure to protect resident horses from horses that have been co-mingled with others at shows, sales, and other events off of the farm.

Pest and rodent control are also part of an efficient biosecurity plan. Reducing standing water means limiting the next generation of flies and mosquitoes, Dwyer said. Feed rooms, tack rooms, and other stable areas should be kept tidy and well swept. This will help to reduce issues with mice and other rodents.

Human traffic is also a potential risk for spreading disease. Therefore, blacksmiths, trainers, veterinarians, and other visitors are advised to disinfect boots and wash hands before entering the barn and handling horses. This can easily be accomplished with an alcohol-based hand disinfectant. Providing running water, liquid hand soap, and clean paper towels in every barn to encourage employees to wash their hands. If running water is not an option, a liquid hand sanitizer can be provided.

According to Dwyer, sharing equipment such as water buckets and feed tubs might pose a potential risk of spreading pathogens from one horse to another. This is especially important to remember while at horse shows and trail rides. If you do let people borrow equipment, be sure to thoroughly clean and disinfect that equipment prior to using it on your own horses.

“Work out a plan with your stuff and veterinarian that includes frequent cleaning routines. A clean environment always reduces the risk of spreading disease,” Dwyer said.

Detergent and water are needed to thoroughly clean surfaces prior to using a disinfectant. Even the best disinfectant is inactivated in the presence of organic matter, such as manure, discharges, and soil. The cleaning step is critical to an effective disinfection program, and prevention is generally easier than cleanup, Dwyer said.

When choosing disinfectants, consult a veterinarian to provide guidance in the effectiveness of various disinfectants in relation to the surfaces to be treated. Disinfectants available on the market include phenols, quaternary ammonium compounds, and peroxide compounds.

Shaila Sigsgaard is a contributing writer.
Musculoskeletal Health

Joint disease and cartilage repair

Orthopedic injuries in young horses not only have a huge economic impact on the horse industry but can also be devastating for the horse owner, said James MacLeod, VMD, PhD, John S. and Elizabeth A. Knight chair and professor of Veterinary Science at the University of Kentucky Gluck Equine Research Center.

Joint disease can result from acute traumatic injury or more chronic osteoarthritis, MacLeod said. Either way, it is one of the most common causes of lameness and a primary reason why the athletic careers of many horses come to an end. When the cartilage that normally covers the ends of adjoining bones is damaged, joint movement is restricted and frequently becomes painful.

“The result is lameness, and a horse that can no longer perform up to its full potential,” MacLeod said.

Despite the importance of articular cartilage for normal joint function and pain-free movement, the tissue has very limited ability to repair structural damage, MacLeod said. This is a primary reason why joint disease problems frequently progress through life and become more serious. Interestingly, however, joint cartilage in young foals appears to have greater capacity for repairs. Early in life the tissue is growing rapidly and structurally remodeling in response to the biomechanical forces of movement.

“Unfortunately, when these processes are complete, any enhanced repair potential is lost,” he said.

Therefore, research studies focused on synovial joint and development and maturation help to identify new therapeutic strategies for cartilage repair.

Parasitology

Eliza test for EPM developed at Gluck Center

A new assay to aid in the diagnosis of Equine Protozoal Myeloencephalitis (EPM) has been developed by Dan Howe, PhD, molecular parasitologist at the University of Kentucky Gluck Equine Research Center. The assay format is an enzyme-linked immunosorbent assay, or ELISA, and it measures antibodies to the surface antigens (SAGs) SnSAG2, SnSAG3, and SnSAG4 of Sarcozystis neurona, the parasite most commonly causing EPM.

These specific SAGs are proteins on the outer surface of the parasite that trigger the horse’s immune system during an infection by S. neurona. By measuring a colorimetric change that is relative to the amount of antibodies in a horse sample, the assay provides quantitative data expressed as a titer. Most horses have varying levels of serum antibodies against S. neurona due to a high natural exposure rate (seroprevalence) to the parasite.

“Although many horses have been exposed to S. neurona and have antibodies against the parasite, this doesn’t necessarily correlate with an ongoing active infection and relatively few horses ever develop EPM disease,” Howe said.

Because of this high seroprevalence rate but low disease incidence, simply detecting antibodies in a horse’s serum provides modest diagnostic information, he said. Instead, cerebrospinal fluid (CSF) obtained by a spinal tap procedure is the best sample for diagnosing EPM.

“The new assay incorporates three unique antigens of S. neurona to measure the antibody response to parasite infection in serum or CSF,” he said.

The western blot, developed at the Gluck Center in the early 1990s, was the first commercially available test to detect a pattern of S. neurona antibodies. Subsequent tests employed different formats for antibody detection, each with their own limitations of use and interpretation. Recent studies indicate that detection of antibodies against SAGs 2, 3, and 4 provide a reliable and accurate indication of EPM disease when both serum and CSF are tested.

A field study on nearly 400 neurologic horses was conducted in collaboration with Rood and Riddle Equine Hospital, Lexington, Ky.; University of Pennsylvania New Bolton Center, Kennett Square, Pa.; University of Florida, Gainesville, Fla.; and the Marion duPont Scott Equine Medical Center, Leesburg, Va. The goals were to evaluate the clinical usefulness and diagnostic parameters of the ELISA test and to reassess the value of obtaining CSF for accurate diagnosis of EPM. Neurological status was determined at case presentation, horses were grouped by diagnosis, and paired serum and CSF from each horse were tested with the ELISA. While serum ELISA titers did not correlate well with an EPM diagnosis, higher CSF titers were more often associated with disease. However, the most diagnostically predic-
Each green petal is a S. neurona parasite.

According to Howe, the serum to CSF comparison provides more accurate information and strongly supports whether there is active infection in the central nervous system. The information from the field study also reaffirmed that performing spinal taps to obtain CSF is an important diagnostic tool, he said.

The assay has been licensed exclusively to Equine Diagnostic Solutions LLC, a private reference laboratory in Lexington, Ky. co-owned by two University of Kentucky graduates.

Shaila Sigsgaard is a contributing writer.

Sarcocystis neurona genome project at the Gluck Center almost complete

Dan Howe, PhD, a professor and molecular parasitologist at the University of Kentucky Gluck Equine Research Center, and colleagues at the Gluck Center are finishing up a three-year project conducting a Sarcocystis neurona genome project.

The primary goal of the project, titled “Genome Sequence for the apicomplexan Sarcocystis neurona,” has been to sequence and assemble the genome of S. neurona, the protozoan (single-cell) parasite that causes protozoal myeloencephalitis (EPM) in horses.

Howe initially received a $500,000 grant from the USDA-CSREES (U.S. Department of Agriculture-Cooperative State Research and Extension Service) competitive grants in 2009. Prior to the S. neurona genome project, Howe had been conducting preliminary sequencing studies in his lab. Initial studies were funded by a gift from Thoroughbred breeders John and Jerry Amerman.

EPM is caused by the parasite Sarcocystis neurona which is one of the most important and commonly diagnosed neurologic diseases in the United States. EPM has a tremendous ongoing impact on the equine industry and equine health due to the considerable cost in terms of diagnosis and care to get a performance horse fully back on its feet for competition. Some horses might never recover entirely again. Symptoms vary from horse to horse, but include loss of coordination, muscle atrophy, sore back, stumbling, locking of the stifle joint, and weakness.

The life cycle of S. neurona initially begins in the definitive host, which is the opossum that passes the oocysts and sporocysts of S. neurona in its feces. In order to complete its life cycle, this parasite needs two hosts, one definitive (final) and one intermediate.

Horses serve as an accidental intermediate host of S. neurona. Horses represent a dead end for the parasite life cycle since they cannot pass the disease among themselves or contract the disease from another infected horse. When grazing on the pasture, ingesting feed or water contaminated with opossum feces, the infective stages of the organism are passed to the small intestine of the horse, where emergence from a cyst eventually takes place.

The infective stage of the organism undergoes several replicative cycles in the blood vessels. In some horses they migrate to the central nervous system where the parasites cause severe neurologic disease. This neurological damage can cause various symptoms, all dependent on the area of the central nervous system parasitized.

The purpose of this project has been to sequence S. neurona, to compare it to sequences from other related parasites, as well as to make the information available to the research community, Howe said.

According to Howe, the study has succeeded in providing new insight to the protozoan which may be useful for the closely related important human parasites such as Toxoplasma and Plasmodium (malaria) that are known to cause significant disease in both humans and other mammals.

The biology of S. neurona resembles other pathogenic apicomplexans and is fairly complex with multiple, lifecycle stages. Howe said the sequencing efforts have revealed molecular diversity among different strains of S. neurona and other Sarcocystis species.

“We have been able to sequence one representative strain at this point, but we hope to obtain genome sequences from at least one, if not several, additional strains,” Howe said. “The tremendous drop in the cost of sequencing now makes this feasible. But at this point, there is no evidence to suggest that any one strain type is more important (i.e., more pathogenic) in horses than others.”

Howe said the genome sequence will contribute to an increased understanding of S. neurona and thereby enhances its value as a comparative model for other members of this important group of pathogens.

“A fully sequenced genome will also provide a resource for characterization of virulence factors and S. neurona antigens, which can lead to new protective immunizations or chemotherapeutics against this parasite,” Howe said. “However, there is a tremendous amount of data to be interpreted before the initial lab work on potential vaccine candidates and chemotherapeutic agents can get started.”

The information from the study will be posted to a public database available for research in EPM. Howe has been collaborating on the project with Chris Schardl, PhD, the Harry E. Wheeler Chair in Plant Mycology and director of the University of Kentucky Advanced Genetic Technologies Center (UK-AGTC), and Jessica Kissing, PhD, of the University of Georgia.

Shaila Sigsgaard is a contributing writer.

Follow the Gluck Equine Research Center on Facebook and Twitter (UKGluckCenter)
Several faculty members from the University of Kentucky Gluck Equine Research Center will participate as speakers at the West Coast Equine Reproduction Symposium IV. The symposium takes place at the Santa Ynez Valley Marriott in Buellton, Calif. Speakers from the Gluck Center, who are all part of its reproductive health group, include Barry Ball, DVM, PhD, Dipl. ACT, professor and Albert G. Clay Endowed Chair in equine reproduction; Ed Squires, PhD, Dipl. ACT (hon.), director of UK Ag Equine Programs and executive director of the UK Gluck Equine Research Foundation; and Mats Troedsson, DVM, PhD, Dipl. ACT, director of the Gluck Center and chair of the department of veterinary science at UK. Ball and Squires are part of the symposium program committee.

The symposium will provide a two-day forum for exchange of timely topics on reproductive management of the problem mare, stallion, and foal for the practicing veterinarian and breeder. On the third day, a wet lab will provide hands-on opportunities on evaluating the problem mare, diagnostic techniques in fertility evaluation of the stallion, managing poor semen quality/quantity and examining/interpreting uterine cytology, biopsy, and sperm morphology.

The symposium benefits the 11th International Symposium on Equine Reproduction (ISER) to be held Jan. 26-31, 2014 in Hamilton, New Zealand. The last ISER meeting was hosted at UK in July 2010. Squires serves as the chair of the ISER committee.

Jenny Evans is the Foundation Coordinator at the Gluck Equine Research Center.

Fertilization and early pregnancy loss in mares

There are a variety of potential causes for pregnancy loss in the mare, said Barry Ball, DVM, PhD, Dipl. ACT, the Albert G. Clay Endowed Chair in equine reproduction at the University of Kentucky’s Gluck Equine Research Center. The age of the mare plays a significant role, but timing of fertilization and early intervention also seem to be key factors to decrease the incidence of early loss. Modern ultrasound is vital to identify the equine embryo early in pregnancy.

The incidence of early pregnancy loss is widely associated with the mares’ age, followed by embryo, oviductal, uterine or endocrine factors, Ball said. Older or multiparous mares have an increased risk of developing abnormal numbers of chromosomes (aneuploidy) presumably due to a prolonged follicular growth.

“As the mare ages, so do her oocytes,” Ball said.

The risk of uterine impairment may be a result of normal aging processes in the mare. Fertilization is a fairly complex process, and the mare presents some unique features in this process. When the egg matures, the oocyte is shed from the follicle into the oviduct, Ball said. At the time of ovulation, the cells that surround the egg, the cumulus cells, undergo a massive expansion that forms a sticky mass of cells allowing the egg to stick to the cilia in the oviduct.

The egg travels down into the fimbria, which is a fringe of tissue at the opening of the oviduct. A glandular structure, called the corpus luteum (CL), is organized from cells producing the hormone progesterone, which is needed to establish and maintain pregnancy, until the placenta comes into function at about 150 days of gestation.

Sperm are transported to the oviduct initiating fertilization prior to ovulation, and in most cases, stored there for several days. The sperm remain viable for two or three days in the oviduct, while the egg is only viable for about six hours after ovulation, which makes timing of insemination vital, Ball said.

The sperm itself is not capable of initiating fertilization until it has been capacitated in the mares’ tract over a short period of time.

“The sperm undergoes a biochemical process close to the to the isthmic oviduct, which acts to both reduce sperm number and enhance the sperm quality,” Ball said.

Following the capacitation, the sperm acquire a hyperactive motility allowing sperm-egg contact. The next step to follow is the acrosome reaction, which allows the sperm to provide the enzymes required to break through the egg. A cortical reaction normally prevents the egg from further fertilization, but a failure in this signal can cause further multiple sperm to fertilize the egg, Ball said.

One of the most important causes of embryo loss during early gestation is post-breeding endometritis. Older mares tend to have a delayed inflammatory response to contaminants, such as semen, but do not show any signs of inflammation other than luminal fluid prior to breeding, Ball said.

The accumulated fluid leads to enhanced inflammation three or four days later, with secondary infection referred to as chronic endometritis, Ball said. Most of these pregnancy losses occur before 20 days and can also develop fertility-threatening changes, such as periglandular fibrosis and scarring in the uterine lining (endometrium) affecting the chances of embryo survival, Ball said.

“Always reduce the number of breedings if there is a history of recurrent endometritis,” Ball said.

Infectious endometritis is the result of bacterial invasion into the uterus, such as Streptococcus. The bacteria typically enter multiparous mares with a poor vulva conformation that doesn’t seal properly exposing the uterus to bacteria. Acute infectious endometritis may be the result of impairment of the uterine defense systems in the older mare, which may be compromised over time.

As soon as the egg is fertilized, it rapidly becomes a zygote, and division of cells begins instantly, Ball said. The fertilized embryo remains in the oviduct for six days.
Pregnancy loss, continued

and then enters the uterus.

“Early pregnancy loss in this period, we typically identify as pre-fixation events from Day 6 to 16. In this period the embryo is very delicate,” Ball said.

According to Ball, loss often occurs in this period due to an imperfect interaction between the embryo and the uterus failing to send the pregnancy signal so mare starts cycling again.

Once the embryo enters the uterus, it rapidly expands and normally become fixed in one spot within the uterus on Day 16 after ovulation generally at the base of one of the uterine horns. Post-fixation events occur from Day 16 and on, Ball said. It eventually becomes a fetus at about Day 40 where the placenta is usually formed.

Shaila Sigggaard is a contributing writer.

News and Events

New Horseman’s Card supports equine research at the UK Gluck Center

Starting this spring, horse owners and equine enthusiasts once again have an easy way to help raise funds for the University of Kentucky Maxwell H. Gluck Equine Research Center via the Horseman’s Card.

Originally introduced in 1992, the Horseman’s Card is a unique credit card with a very specific goal in mind: supporting the health of the horse. Every time a card holder uses his or her card to make a purchase, a donation is made to the Gluck Center at no additional cost to the card holder. Through the decades the program has generated hundreds of thousands of dollars for equine research.

“With the Horseman’s Card you can truly make a difference,” said Ed Squires, PhD, Dipl. ACT (hon.), director of UK Ag Equine Programs and executive director of the UK Gluck Equine Research Foundation. “At the heart of our research is the horse. The kind of support that the Horseman’s Card provides us is what makes advances in equine health and science possible.”

When the Horseman’s Card’s contract with its former card issuing bank was not renewed last year, donations temporarily stopped, but those behind the card viewed it as an opportunity to improve the program. As a result, a lot of thought went into selecting UMB Bank, a Missouri-based bank, as its new banking partner. Now, 20 years after it was first offered, the card is being reintroduced and funds will once again be heading the Gluck Center’s way.

“These funds provide the flexibility to allow us to fund research needs that may become urgent in a given year, such as an outbreak of a disease,” Squires said.

Beyond equine research, the Horseman’s Card also comes with several other perks. Card holders now have the ability to personalize their cards with their own photo or to select from five full-color images created by famed equine artist James L. Crow. They also receive VIP discounts from dozens of nationally-recognized equestrian retailers and will benefit from a focus on improved customer service.

“We carefully selected our new banking relationship with UMB, so we could add a number of exciting features,” said the program’s founder, Mark Cole. “Additionally, we had a goal of providing a higher level of service and card holder satisfaction. We especially like the fact that any time a card holder has a question or issue with their Horseman’s Card, they can speak directly to an actual bank employee – not some third-party vendor in a faraway place.

“Furthermore, every person who loves horses is concerned with the health of the horse, and what better way to enhance horse health than to support one of the world’s leading equine research facilities?”

It is important to note that existing Horseman’s Card holders will have to re-apply if they wish to continue supporting equine health. Cards not held through UMB Bank are still valid as credit cards, but they are no longer associated with equine research and do not qualify for the VIP discounts. Please contact the phone number on the back of your card to verify if your card participates in the VIP program.

Although that is a small hassle, those who support the concept behind the Horseman’s Card hope that horse enthusiasts will still take part in the program because of the good it does for equine research.

For more information about The Horseman’s Card, or to apply, visit www.horsmanscard.com. Additionally, join other equine enthusiasts by liking The Horseman’s Card on Facebook, following the card on Twitter, and finding it on Google+.

Amanda Duckworth, on behalf of The Horseman’s Card, contributed this information.

Grayson-Jockey Club funds immune response to vaccination study

A study titled “Do Non-Steroidal Anti-Inflammatory Drugs affect the Immune Response to Vaccination in Horses?” will be funded for a year by the Grayson-Jockey Club Research Foundation. The principle investigator of the study is David Horohov, PhD, Jes E. and Clementine M. Schlaikjer Endowed Chair at the University of Kentucky Gluck Equine Research Center.

Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) are sometimes prescribed prior to a vaccination in order to reduce the chance of an adverse reaction to that vaccination. Horohov observes that the reasoning behind this “might seem sound,” but there is the concern that the NSAIDs might have the unintended consequence of actually impeding the ability of the horse’s system to respond to the vaccination as intended.

This project will determine the effect of NSAIDs on the ability of a horse to benefit from a commercial influenza vaccine. The results will help veterinarians and horse owners to make more informed decisions regarding use of the NSAIDs when vaccinating.

The Gluck Equine Research Center encompasses faculty members that conduct equine research full time in the areas of infectious diseases and immunology, genetics and genomics, musculoskeletal science, parasitology, pharmacology/toxicology and reproductive health.

Gifts to the Gluck Equine Research Center are used to support research, build facilities, purchase equipment, provide scholarships for graduate students, create educational material and provide continuing education programs for Veterinarians and Horsemen.

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