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Dr. Gene Lyons, Longtime UK Parasitologist, Dies

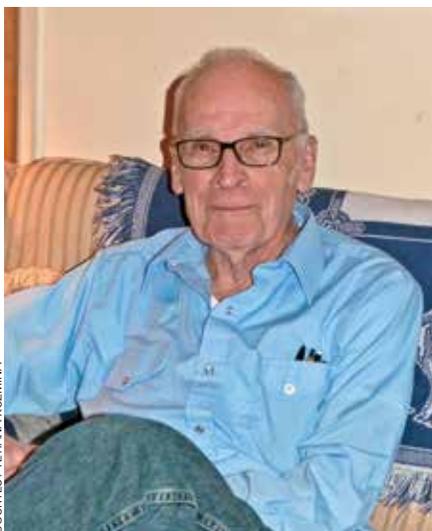
Eugene T. Lyons, PhD, a longtime University of Kentucky (UK) Department of Veterinary Science faculty member, died Dec. 7. He was 86.

Lyons joined the department's faculty in 1963 and still had an active parasitology research agenda at the time of his death. Throughout his 56-year career, his work on equine helminth infections attracted interest from scientists and researchers around the world. He was the first to demonstrate helminth parasite transmission from mother seals to their offspring through their milk; later he expanded this observation to a number of equine helminth infections and altered current thinking on the epidemiology of different equine endoparasitic diseases.

Lyons specifically described the lactogenic life cycle of the equine threadworm, *Strongyloides westeri*. Other contributions include describing life cycles of other important parasites, along with testing every equine dewormer that reached the market.

His passion for research extended beyond his equine parasitology work as a professor at the UK Gluck Equine Research Center and in service to local horse farms. He frequently spent his vacations studying parasitology in fur seals and sea lions in places such as Alaska, California, and Australia.

"Dr. Lyons made multiple contributions to the field of parasitology through a lifetime of devotion to his work and a commitment to excellence to this field," said David Horohov, PhD, Gluck Center director and department



COURTESY TETIANA KUZMINA

Dr. Gene Lyons died Dec. 7 at the age of 86.

chair. "His legacy will include the contributions he has made and the people he has trained."

Lyons is also known for his research on acquired anthelmintic resistance in small roundworms.

"The equine, farm, veterinary, and research communities have lost an exceptionally dedicated scientist and friend," said Nancy Cox, MS, PhD, dean of the UK College of Agriculture, Food and Environment.

Born May 6, 1931, in Yankton, South Dakota, Lyons served in the United States Coast Guard from 1950-1953. He received his bachelor's degree in zoology (wildlife) from South Dakota State University in 1956, his master's in zoology (parasitology) from Kansas State University in 1958, and his doctorate in zoology (parasitology) from Colorado State University in 1963.

Lyons published more than 300 peer-reviewed articles and book chapters. He mentored more than a dozen graduate and undergraduate students, and he hosted and mentored more than 25 visiting scientists and students in his laboratory throughout his career.

"Dr. Lyons was a legend, a giant in veterinary parasitology," said Martin Nielsen, DVM, PhD, Dipl. ACVL, Dipl. EVPC, associate professor and Schlaikjer Professor of Equine Infectious Disease at the Gluck Center. "His list of contributions to veterinary science is remarkable and too long to summarize here. People traveled from across the world to meet him and to learn from him. I feel very fortunate to have worked with him and learned from him. Never have I seen this much enthusiasm and passion for research, biology, parasites, horses, and sea lions. He will forever serve as my role model."

In 1976 Lyons received the Thomas Poe Cooper Award from UK for his threadworm research. In 2012, he was inducted into the Equine Research Hall of Fame, housed at the Gluck Center. 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.

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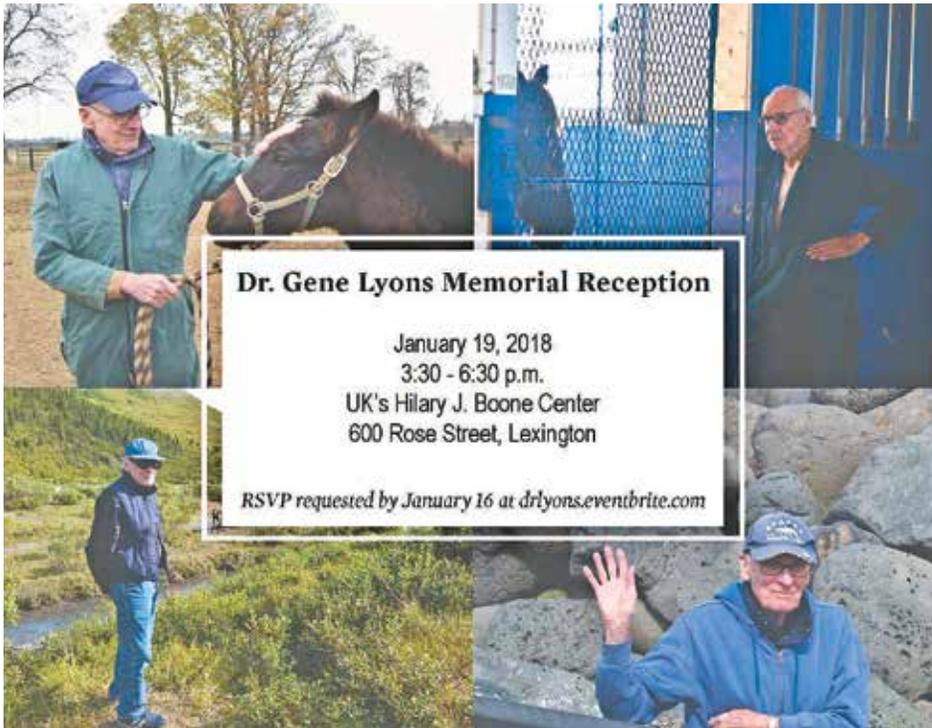
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Dr. Gene Lyons Dies

During his Equine Research Hall of Fame induction, Lyons credited those who worked in his laboratory for his success, saying, "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." **UK**

>Jenny Evans, MFA, is the senior veterinary science marketing and promotion specialist at the UK Gluck Equine Research Center.



Gene Lyons and Sharon Tolliver: An Era in Veterinary Parasitology

This commentary was written by Martin Nielsen, DVM, PhD, Dipl. ACVIM, associate professor and Schlaikjer Professor of Equine Infectious Disease, at the UK Gluck Equine Research Center.

This year, 2017, was a sad year for veterinary parasitology. Two of the world's most recognized scientists in their field—Dr. Eugene T. Lyons and Ms. Sharon C. Tolliver—recently passed away, marking the end of an era.

The UK parasitology research program celebrated its 70th anniversary in 2017. Of these 70 years, Gene Lyons and Sharon Tolliver worked in the program for 56 and 52 years, respectively. In other words, they *were* the research program. And each remained active at UK until their death.

They influenced and were appreciated by colleagues around the world who had the opportunity to know and work with them—students, postdocs, visiting scientists, and countless other individuals in the equine and veterinary industries who worked and interacted with them over the decades.

They had a unique working relationship and did most things together, including farm visits to collect fecal samples, post-mortem parasite specimen collection and identification, and manuscript writing. Gene would draft the paper, then Sharon would proofread it and organize the references. During farm visits, Gene would go

Masthead

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Gene Lyons and Sharon Tolliver

into a stall to collect a fecal sample from a horse, and Sharon would track it on the clipboard and keep all samples organized. They worked together in symbiosis.

Sharon was one of very few experts in the world on microscopic helminth parasite identification and she co-authored more than 200 research publications. Her monograph describing morphological characteristics of equine small strongyle (cyathostomin) parasites in her own down-to-earth language remains as an incredible monument to her expertise and significance as a scientist.

What was really remarkable about Gene and Sharon was how they both loved interacting with students and young, aspiring researchers. The list of students, visiting scientists, and collaborators who had the opportunity to come and spend time with them is extremely long. I, myself, was one of probably several hundred who had the wonderful experience of being taken under their wings when I first came to the Gluck Center many years ago. Gene was my tour guide and drove me around the Bluegrass state, determined to show me how unique this area is, and he took me to well-selected local restaurants to make sure I got to taste the local Southern cuisine. Sharon took time to show me all of her small strongyle parasite specimens, and talked about how one particular species had features resembling “dangling duck feet” and how the male of another species was her favorite because he was “so handsome.” And she would make sandwiches for us right there in the lab. I am sure that many people reading this have had very similar experiences. It felt like they welcomed me to a family.

It has always struck me how helpful they were. They were never too busy to demonstrate a technique or show a particular parasite specimen from their valuable collections. Very typical for Gene, whenever asked a question, he might not come up with a useful answer right away, but within a day, he would bring a pile of papers or Internet links with useful information about the given topic. I happen to have one such stack right here on my desk, as I asked him a question two days before his passing.



From left to right: Dr. Gene Lyons, Jamie Norris, Ashley Steuer, Katie Lacy, Alex Bertke, Jessica Scare, Jennifer Bellaw, and Sharon Tolliver.

The term “walking encyclopedia” is a cliché, but it describes Gene well. He was such a resource to our program, a go-to person. “Go ask Dr. Lyons,” was often my response to my students when they were struggling with a question. And they would sit down and talk with him for hours.

One of my greatest pleasures of working with Gene was the students we shared. I have enjoyed how many of these students, after completing a visit or graduating from the university and going elsewhere, have said that meeting and interacting with Dr. Lyons

“You can always learn something new.”

DR. GENE LYONS

was the best of all the experiences they had here. These days, social media is loaded with pictures of Dr. Lyons with these young people. As I look at them, I see him smiling, laughing, and clearly enjoying himself in each and every one of them. Yes, Dr. Lyons enjoyed life. He had a passion for work—seven days a week, year-round, no vacations—but, he loved and cherished these interactions with people. Not just with students, but farm personnel, veterinarians, farm managers, and collaborators around the world. Dr. Lyons was a people person.

It is hard to adequately describe Gene’s and Sharon’s scientific contributions. Gene published more than 300

research papers, and he was working on new manuscripts and research ideas when he passed. One of his major milestones was the description of lactogenic equine threadworm, *Strongyloides westeri*, transmission. For his PhD, he unraveled the life cycle of a hookworm parasite of sea lions and described how pups were infected through the colostrum while suckling. Upon his arrival in Kentucky in 1963, he was determined to investigate the threadworm life cycle as he was suspicious that a similar mode of transmission could be at play. It took him 10 years of hard work to document this. He would wait by the phone day and night for farm managers’ calls when a mare foaled, and he’d drive out to the farm to get a colostrum sample, even in the middle of the night.

For a long time he did not find a single parasite larva in those samples. At this point, most people would have rejected that hypothesis and focused their time on other projects. But, very typical for Dr. Lyons, he just kept going. Instead of focusing on the colostrum, he decided to get milk samples during the first couple of months of lactation from a large number of mares, and one day he found the first parasitic larva. In 1973, he published a milestone paper describing these findings, which were unprecedented at the time. He received the Thomas Poe Cooper Award for this work in 1976.

Dr. Lyons made many more significant contributions together with Sharon, Dr. Harold Drudge (DVM, ScD),

GRAD STUDENT SPOTLIGHT

MORGAN PYLES

From: Lander, Wyoming

Degrees and institutions where received:

AAS in horse management with additional credentials in teaching, riding and equine training technologies, Central Wyoming College
BS in equine science and management, University of Kentucky (UK)



Morgan Pyles attended UK for her bachelor of science in equine science and management degree. During that time, she developed an interest in research and decided to continue her education through graduate school.

She began her master's program with Laurie Lawrence, PhD, a professor in UK's Department of Animal and Food Sciences in the fall of 2014 and completed it in 2016. During her master's work, Pyles again decided she wanted to continue her education and subsequently began work on her PhD, also under Lawrence.

When asked why she chose UK, Pyles said, "Is there really a better place to study anything equine-related than Central Kentucky, the horse capital of the world?"

Pyles also admires the UK faculty and loves the research she carries out with Lawrence.

"There are a lot of great nutritionists in the Animal Science Department and I have been able to learn so much from them that I can now use in my research," she said. "There isn't anywhere else I would rather be to study equine nutrition."

Pyles' main research interest is mare and foal nutrition with a specific focus on how a mare's diet influences her milk composition and, in turn, how those milk components influence the foal's gastrointestinal tract development.

"Research has demonstrated the importance of milk components to neonatal health," she said. "However, little is known of the influence of mare milk components on the microbes in the foal's gastrointestinal tract. This area of research is novel and may provide insight in the prevention of gastrointestinal disease in the foal which has a major economic impact in the equine industry."

When asked what her most valuable take away from the program was, Pyles said, "The equine industry is a very small world. Chances are pretty good that you know someone who knows someone else who knows you. Because of this, meeting people and making connections is very important

"I have really enjoyed going to conferences and meeting people from across the country and then being able to connect with them again at another conference," she said. "The people you meet now may one day be your colleagues. You never know when those connections may come in handy later in life."

Pyles plans to complete her doctoral program by the end of 2019 or the spring of 2020. Afterwards, she hopes to find a faculty position and begin teaching and conducting research. [UK](#)

>Alexandra Harper, MBA, is the operations and communications coordinator for the UK Ag Equine Programs.

Gene Lyons and Sharon Tolliver

and their other long-time technician Sandra Collins. They described the life cycles of the eyeworm, *Thelazia lacrymalis*, and the bloodworm, *Strongylus vulgaris*. They tested every single equine dewormer that ever made it to the market, and a lot of those that didn't. They documented the presence and propagation of drug-resistant parasites, and they meticulously tracked and described changes in prevalence and abundance of important equine parasites across more than five decades.

In addition to this, Dr. Lyons is also a world authority on parasites infecting seals, sea lions, and other pinnipeds. He made strenuous field trips out in the wilderness to visit remote locations all over the world to study these animals and their parasites. He had a great passion for everything biological and these trips, however demanding, were near and dear to his heart.

One great memory is when he decided to give a presentation to the entire department describing his sea mammal work. He gave a wonderful talk with beautiful images, sound clips, and videos from his trips. It was just amazing how passionate he was, and we were all left in awe. He will forever serve as a role model for me and, I am sure, many others, as well.

Both Gene and Sharon were widely recognized across the world for their expertise. Sharon was inducted into the Pendleton County School System Wall of Fame in 2006. In addition to the Thomas Poe Cooper Award, Dr. Lyons was also co-recipient of the 1991 American Association of Veterinary Parasitologists Distinguished Veterinary Parasitologist Award, together with his research companion, Dr. Harold Drudge. Last, but not least, Dr. Lyons was inducted into the Equine Research Hall of Fame in 2012.

Gene and Sharon were classical parasitologists *par excellence*, and their passings mark the end of an era. An era that gave us the biological information that we take for granted today, and an era which revolutionized how parasite control is approached today. It must have pleased them both to witness how classical deeds never went out of fashion. We may have nanotechnology, DNA and RNA sequencing, and bioinformatics, but, at the end of the day, someone has to be able to identify that parasite and describe how it develops within its host before we can apply all these new technologies. Gene and Sharon have passed these skills onto us, and we are forever thankful. It is now up to us, in the new era, to combine these disciplines in multidisciplinary projects to further advance our knowledge about parasites and provide and expand the tool set we need to adequately control them.

Gene Lyons and Sharon Tolliver

We have lost two extremely hard-working and very dedicated people. They were extremely skilled, passionate, and compassionate. They leave an incredible legacy and we are forever grateful to have known and worked with them. Their contributions will never be forgotten, and we are dedicated to continuing the parasitology research program that they founded and built so successfully. Dr. Lyons remained curious and enthusiastic to his last day.

One statement Dr. Lyons often said keeps resonating in my head, and I hope this statement will be our mantra as we walk in his footsteps: "You can always learn something new." **UK**

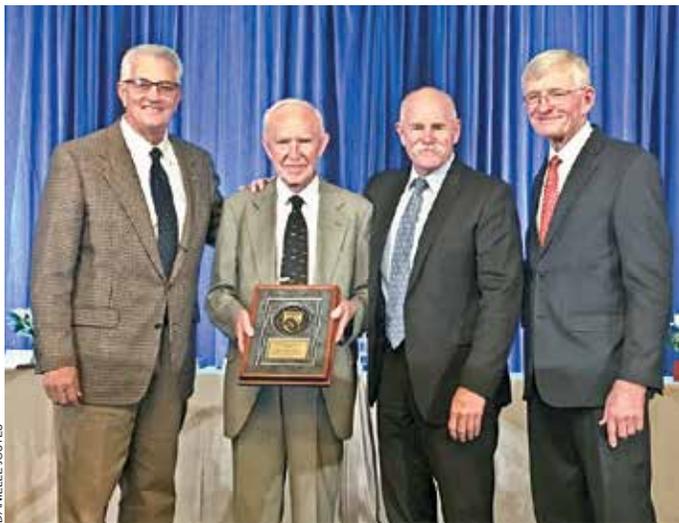
Peter Timoney Named AAEP Distinguished Educator

Peter Timoney, MVB, MS, PhD, FRCVS, professor and the Frederick Van Lennep Chair in Equine Veterinary Science at the UK Gluck Equine Research Center, received the American Association of Equine Practitioners' (AAEP) 2017 Distinguished Educator – Academic Award for his influential contributions to the body of knowledge on equine infectious diseases.

He was honored Nov. 20 during the President's Luncheon at the AAEP's 63rd Annual Convention, in San Antonio, Texas.

The Distinguished Educator – Academic Award honors an individual who, by his or her actions and commitment, has demonstrated a significant impact on the development and training of equine practitioners.

Throughout his five-decade career, Timoney has provided key insight, guidance, and authorship to numerous infectious disease control documents and guidelines—benefitting veterinarians and horse owners around the world. He also has advised and provided technical expertise to thousands of



DANIELLE JOSTES

Left to Right: Dr. Rocky Bigbie, Zoetis; Dr. Peter Timoney, UK Gluck Equine Research Center; Dr. Kenton Morgan, Zoetis; and Dr. Reynolds Cowles, 2017 AAEP president.

UKVDL Disease Mapping Initiative Featured Map

Rocky Mountain Spotted Fever

Rocky Mountain spotted fever is caused by *Rickettsia rickettsii*. It is one of many *Rickettsia* organisms which, on the evolutionary scale, are between bacteria and viruses.

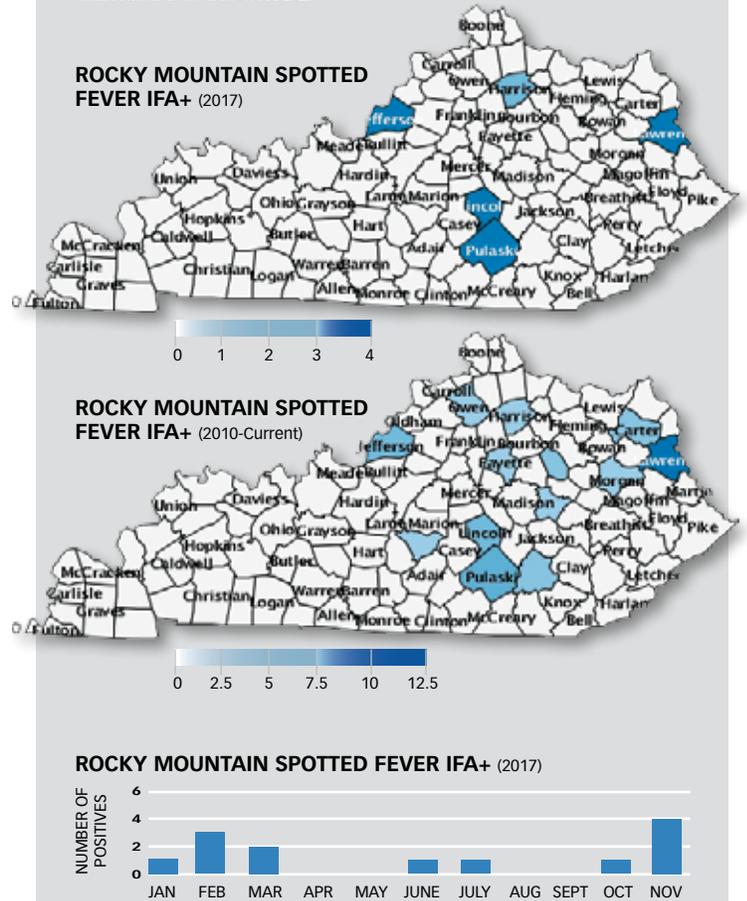
It is transmitted by ticks, is most prevalent in the East Coast, Midwest, and Great Plains regions, and affects dogs and humans. Researchers have learned via blood tests that cats can also become infected, but disease in cats is uncommon. Various rodents, raccoons, and foxes can also carry *R. rickettsii*.

Affected dogs cannot transmit Rocky Mountain spotted fever to people. However, humans can become infected via a tick bite or by handling a tick's inner contents. This is why it is important to not remove ticks from pets, including horses, with bare hands.

There is no vaccine for Rocky Mountain spotted fever. Prevention centers on tick control, with rodent control being a secondary priority.

Individuals with questions or concerns about disease outbreaks can contact the University of Kentucky Veterinary Diagnostic Laboratory (UKVDL) at 859/257-8283. **UK**

>Jacqueline Smith, PhD, MSc, BSc, Dipl. AVES, UKVDL epidemiologist and adjunct professor of epidemiology at Lincoln Memorial University, is the founder of the UKVDL Disease Mapping Initiative, a database designed to record all infectious disease cases submitted to the UKVDL.



See each month's featured map at vdl.uky.edu/FeaturedMap

Peter Timoney

equine practitioners through individual communication and presentations at international veterinary gatherings.

Kenton Morgan, DVM, an equine specialist with Zoetis and former AAEP board member, praised Timoney's dedication to the betterment of his fellow practitioners.

"No matter how busy he may be, there is always time for Peter to talk

to practitioners with questions on any aspect of how to prevent, diagnose and control infectious diseases of the horse," he said. "On the topic of equine infectious diseases, there is none more respected or admired, either locally or internationally."

Timoney earned his MVB with honors from the National University of Ireland's Dublin campus in 1964. He received his MS from the University of Illinois in 1966, his PhD from the University of Dublin in 1974, and

his FRCVS credentials in 1978. In 1979, he returned to the United States and spent three years at the Cornell University diagnostic laboratory as a senior virologist.

Timoney has been on faculty at UK's Department of Veterinary Science for 34 years. He served as chair of the department from 1990-1999 and in 2002; and as director of the Gluck Center from 1990-2008. [UK](#)

>Edited AAEP press release.

Dr. Stuart Brown Received 2017 AAEP President's Award

Stuart Brown, DVM, chair of the UK Gluck Equine Research Foundation Board of Directors and a partner at Hagyard Equine Medical Institute, received the President's Award during the Nov. 20 President's Luncheon at the AAEP Convention.

The President's Award, selected by the sitting AAEP president, honors an AAEP member(s) who has demonstrated a dedication to the association during the past year by contributing a significant portion of time and expertise to benefit the health and welfare of the horse.

Brown was recognized for his service as an AAEP representative to the American Veterinary Medical Association (AVMA) House of Delegates and his legislative advocacy for the racehorse.

"If there was ever the perfect politically savvy AAEP member, it might be Stuart Brown," said 2017 AAEP President Reynolds Cowles, DVM. "Not only is he an active practitioner who has represented us in the halls of the AVMA, he has served on the Kentucky Racing Commission—and most importantly for AAEP—he has been a great liaison with those in Congressman (Andy) Barr's office, officials of The Jockey Club and various race tracks, and has been a good facilitator of discussions that serve the horse and our members."

After receiving his veterinary degree from Tuskegee University in 1991, Brown joined Hagyard where he specializes in reproduction, public auction sales evaluations, and general practice within the Thoroughbred industry. He is a member of the AAEP's Racing Committee and previously served on the board of directors and Welfare and Public Policy Advisory Council. [UK](#)

>Edited AAEP press release.

Immunosenescence: What Owners of Old Horses Need to Know

Researchers have made great strides in understanding how we can combat some of the effects of immunosenescence and inflamm-aging so lifespan equals health-span for the older horse.



From T-cells to IgG, equine immunology isn't the easiest topic to understand. However, it holds some practical information that owners can use as they're managing their older horses day to day.

For instance, understanding immunosenescence and how it impacts senior horses

can help owners make decisions regarding multiple facets of their care. At the UK senior horse care mini-symposium, held Sept. 27 in Lexington, Amanda Adams, PhD, reviewed immunosenescence and how it affects old horse care. Adams is an associate professor at UK's Gluck Equine Research Center and focuses her research on the geriatric horse's immune system.

Here's a look at how immunosenescence and its effects impact the way owners and veterinarians care for senior horses.

What is it?

Immunosenescence describes a phenomenon in which as horses age, their immune systems decline. This can contribute to an increased prevalence of autoimmune and chronic diseases and increased susceptibility to infectious diseases.

It often goes hand-in-hand with a

Immunosenescence

chronic state of low-grade inflammation called inflamm-aging. Through her research Adams has confirmed that older horses have increased inflammation at both the systemic and cellular levels compared to younger horses.

How Does it Impact Vaccinations?

In addition to diminishing old horses' immune responses, immunosenescence dampens their immune response to vaccination compared to younger horses. That said, Adams and colleagues were interested in determining whether various vaccine formulations (i.e., inactivated vs. live vaccines) work differently in aged horses. They found

that both inactivated vaccines and the live vectored vaccine induced significant antibody responses in these old horses. Surprisingly, she said, one of the inactivated vaccines studied did a better job inducing antibody response and did the best job stimulating cell-mediated immune responses, which are important for combating viral infections. The team also tested whether giving a second dose of the vaccine 28 days after the first might further boost the horses' immune response, which it did not.

"More than likely the differences we saw in this study were due to differences in adjuvants (a substance included in inactivated vaccines to enhance the immune response) and antigen dose, all things we need to further understand," Adams said.

Her research team has also tested whether the most common endocrine disorder in senior horses—pituitary pars intermedia dysfunction (PPID)—further reduced immune responses to vaccines. She tested a multivalent (combination) vaccine containing Eastern and Western equine encephalomyelitis, tetanus, equine influenza (EIV), rhinopneumonitis (EHV-1), and West Nile virus (WNV) in senior horses with and without PPID. Her team found that all horses showed a significant increase in EIV, EHV-1, and WNV antibodies and that there was no significant difference in immune response to the EIV vaccine between PPID horses and non-PPID horses of matched age. However, they did note some differences in EHV-1 and WNV vaccine responses, she said; PPID horses had a higher response to the former product and a reduced response to the latter compared to healthy old horses.

Adams' current vaccination-related research includes comparing multivalent and monovalent (which provide protection against many diseases vs. one disease, respectively) vaccines, studying immune responses and antibody decay post-vaccination, and determining how long immunity lasts following vaccination in older horses compared to younger adult horses.

WHAT THIS MEANS FOR OWNERS

More research is needed to pinpoint the "ideal" vaccination program for senior horses. For now, Adams recommended owners keep their senior horses—especially those with PPID—on a regular vaccination program. Include all core vaccines (EEE/WEE, rabies, tetanus, and WNV), and work with your veterinarian to determine if senior horses need any risk-based vaccines. For example, an aged performance horse that still travels and shows should receive EIV and EHV-1 vaccines, an older broodmare might need a rotavirus vaccine, and senior horses residing in certain areas might benefit from a botulism vaccine.

How Does it Impact Deworming?

Another effect of immunosenescence is an increased susceptibility to harboring parasites and their eggs and a reduced immune response to deworming treatment.

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Immunosenescence

Adams and colleagues conducted a study in which they compared old and middle-aged horses' immune responses to two common dewormers—moxidectin and pyrantel pamoate. They left a control group untreated. They found that, in their study population, the geriatric horses were more likely to be high shedders on fecal egg counts (FECs) compared to the younger horses; Adams cautioned that this might be a farm-specific finding and encouraged owners to carry out FECs on their own horses. There was also evidence of fewer inflammatory reactions following moxidectin treatment compared to pyrantel, but “that doesn't mean it is the only drug that should be used,” Adams said. “Use something that works, regardless of horse age.”

WHAT THIS MEANS FOR OWNERS

Senior horses might be higher egg shedders than younger horses; however, you'll need to conduct FECs to determine if this is true for your own horses. Keep your seniors on a regular parasite control program (which typically includes spring and fall deworming based on the AAEP's recommendations,

Adams said), but deworm based on your horse's FEC results. Finally, carry out FEC reduction tests, which evaluate dewormer efficiency in your herd.

How Does Nutrition Impact Age-Related Immune Response Changes?

There's currently less evidence on how immunosenescence and nutrition are related, but Adams has been conducting studies to try to learn more.

In one investigation, she found that a commercially available senior horse feed containing a proprietary prebiotic caused inflammatory cytokines associated with the inflamm-aging response to decrease over time. In a second study, Adams and colleagues found that feeding the proprietary probiotic improved senior horses' immune response to EIV vaccination and, again, reduced inflammation.

Adams' research group has also begun evaluating whether polyphenols (naturally occurring antioxidants found in specific fruits, vegetables, cereals, and beverages) impact inflammatory cytokine production. So far, they've determined that polyphenols—including curcuminoids, resveratrol, and quercetin, among others—can help reduce systemic inflammation *in vitro* (in the

laboratory), “but we need to know more about how these compounds work systemically in the older horse,” she said.

Adams said she's currently conducting additional research on how diet impacts inflammation in horses with PPID, insulin dysregulation, and both.

WHAT THIS MEANS FOR OWNERS

The ultimate goal is to reduce inflammation and improve immune function through nutrition. At the moment, however, more research is needed before specific recommendations can be made.

Generally speaking, Adams said, “Keep the older horse on a balanced diet, and don't hesitate to reach out to a nutritionist to help determine what nutrition is best for your older horse.”

Take-Home Message

While there's still more to learn, researchers have made great strides in understanding how immunosenescence and inflamm-aging impact senior horses and how we can combat some of those effects so that lifespan equals health-span for the older horse. **UK**

>Erica Larson is the news editor for *The Horse*.

Feeding PPID and IR Senior Horses

An estimated 30% of senior horses suffer from PPID. That means up to a third of aged horses could be impacted by its effects and clinical signs, such as abnormal hair growth, increased drinking and urination, a pot-bellied appearance, muscle loss, abnormal fat distribution, and chronic or relapsing laminitis.

Although PPID is an endocrine disorder, with it comes many nutrition-related challenges, meaning many of owners and managers must devise precise feeding plans to keep horses with PPID healthy and reduce the likelihood of complications. And,



Loss of muscle mass, especially in the gluteal muscles and along the topline, is a common effect of aging in horses, but even more common in senior horses with PPID.

while not all PPID horses are insulin resistant (IR), studies have shown that many are, which adds another level of complexity to designing an appropriate diet.

Fortunately, owners don't have to go it alone. Kristine Urschel, PhD, shared advice on feeding horses with PPID and/or insulin resistance at the senior horse care

mini-symposium. Urschel is an associate professor of equine science in UK's Department of Animal and Food Science.

Nutritional Management Goals

The first step in planning a diet is to determine your goals. Urschel said the nutritional goals for PPID horses include:

- Reducing sarcopenia (muscle wasting);
- Combating water and electrolyte loss due to frequent urination; and
- If present, managing insulin resistance.

Urschel cautioned that, although many IR horses are obese, some remain at a healthy weight. As such, it's important not to assume



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Feeding Seniors

lean PPID horses aren't IR; doing so could have dire consequences for your horse.

If you determine you have an IR horse, Urschel said, your goals should be to:

- Manage obesity;
- Reduce nonstructural carbohydrate (NSC, essentially the sugars and starches in the diet) intake; and
- Modulate the insulin-sensitive signaling pathways—in other words, improve the horse's insulin sensitivity via diet.

Tips for Achieving Nutritional Management Goals

Goals are great, but you must have a plan for achieving them. Urschel shared tips on how to adjust horses' diets to reach objectives. She encouraged attendees to work with equine nutritionists or veterinarians to ensure horses' nutritional needs are being met.

Manage obesity Aim to reduce your horse's body weight by 0.5 to 1.25% each week, but realize the actual rates might be highly variable, Urschel said. To help your horse shed pounds:

- Reduce feed quantity (such as feeding hay at 1.25% of the horse's body weight per day) and/or quality (feeding a grass hay over a legume or late-maturity forage as opposed to an early-maturity forage).
- Avoid feeding high-calorie grains and concentrates.
- Ensure all your horse's nutrient requirements are being met by adding a protein-, vitamin-, and mineral-dense ration balancer to the diet.
- Feed smaller meals more frequently.
- Turn horses out in drylots, or use a grazing muzzle if they must be turned out on pasture.

- Add exercise whenever possible.

Reduce NSC intake Your IR horse's total daily ration should include less than 10% NSC. To achieve this:

- Have hay analyzed in a laboratory to ensure its NSC content is below that threshold.
- Consider soaking hay to reduce water-soluble carbohydrate concentrations. Urschel said one study showed that soaking grass hay with 18.2% NSC for seven and 16 hours reduced the NSC level to 13.8% and 10.5%, respectively. She cautioned, however, that soaking also reduced the amount of important water-soluble minerals (including sodium, chloride, and calcium,

- Know when (each day and throughout the year) NSC levels are highest in pastures. Daily, levels begin rising in the morning, peak in the late afternoon, and decline overnight. Annually, levels are highest during the spring and fall. Urschel recommended keeping IR horses off pastures during periods of rapid growth in the spring and fall, avoiding overgrazing, and turning horses out at night when levels are low rather than during the day.
- If your IR horse isn't overweight and needs additional calories, choose a low-NSC commercial feed and/or an appropriate ration balancer. Urschel cautioned that there's no

fructooligosaccharides (a common ingredient in prebiotics usually listed as FOS); omega-3 fatty acids, and chromium.

Reduce muscle loss Urschel said loss of muscle mass, especially in the gluteal muscles and along the topline, is a common effect of aging in horses, but even more common in senior horses with PPID. Studies have shown that owners report a loss of muscle tone in 24% of horses over age 15, a wasted topline in 27% of horses over 15, and a wasted topline in 48% of horses over 15 that also have PPID.

Muscle mass is determined by protein synthesis and breakdown, both of which occur simultaneously, Urschel said; essentially, greater protein synthesis than breakdown results in more muscle mass, while increased protein breakdown compared to synthesis results in less muscle mass.

Studies in people have shown that seniors have decreased protein synthesis than younger adults when taking in the same amount of protein and that seniors must consume additional protein after exercise to maximize the rate of protein synthesis. Further, she said, "a combination of resistance exercise (anything that causes the skeletal muscles to contract, such as weight lifting or stretching with resistance bands) and the consumption of good-quality protein increases the rates of muscle protein synthesis."

So does that translate to horses? Maybe, Urschel said.

To help senior horses—with or without PPID and/or IR—maintain muscle mass, she recommended:

- Feeding a good-quality, easily digestible protein that has a good amino acid (the "building blocks" of protein) balance; and

If obesity is a concern aim to reduce your horse's body weight by 0.5% to 1.25% each week, but realize the actual rate will likely vary.

among others) in the hay. As such, she recommended feeding your horse an appropriate ration balancer if you soak hay. And while hay soaking can be labor-intensive, it might be worth the effort: Urschel said studies have shown that hay soaking combined with feed restriction improved insulin sensitivity in obese horses.

- If your current forage doesn't have low NSC levels and soaking isn't feasible, choose a different hay variety. Teff hay, for example, has a 5.4% to 8.4% NSC level, Urschel said. Horses also tend to find it less palatable and, thus, consume less.

set criteria as to what's considered "low-NSC," so do appropriate research and find products ideally below that 10% NSC threshold.

Improve insulin sensitivity In addition to the previous recommendations, which can help improve horses' insulin sensitivities, owners sometimes ask whether supplements will help their horses' progress.

"There's limited research data in horses, particularly aged horses to support their use," Urschel said, "but certain supplements have been proposed to help with insulin resistance in horses."

Such ingredients include resveratrol, short-chain

Feeding Seniors

■ Incorporating exercise or movement into senior horses' routines whenever possible.

Combat water and electrolyte loss Two common clinical signs of PPID—increased sweating and

increased urination—leave affected horses at risk of losing water and electrolytes. Urschel recommended:

- Ensuring free access to fresh, clean, unfrozen water (to replace fluid losses);
- Free-choice salt access or to supplement feed with salt (to replace sodium and chloride losses); and

■ Feeding a high-quality forage (to replenish potassium losses).

Take-Home Message

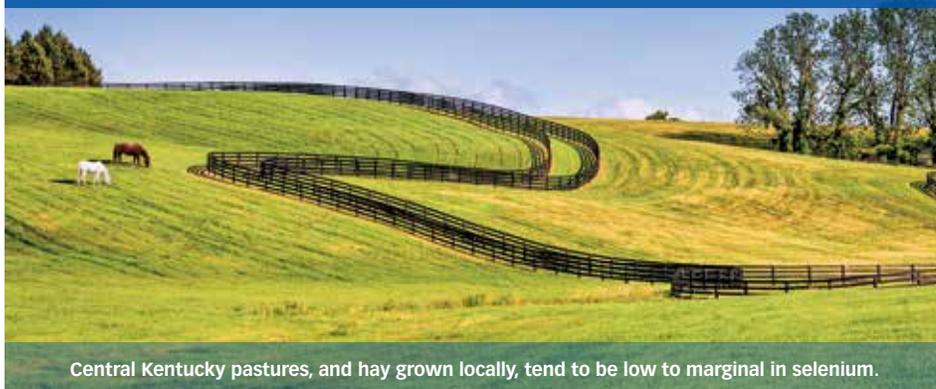
"Dietary considerations are necessary in the management of PPID and insulin resistance in aged horses," Urschel said in closing.

Diets should be largely forage-based and consider each horse's specific needs.

If you have questions about feeding a particular senior horse, consult your veterinarian or equine nutritionist for assistance. **UK**

>Erica Larson is the news editor for *The Horse*.

Mineral of the Month: Selenium



Central Kentucky pastures, and hay grown locally, tend to be low to marginal in selenium.

Named after the Greek word for moon, *selene*, selenium (Se) is a unique trace mineral that has held scientists' fascination for decades.

One of the first prominent discoveries about selenium was its ability to prevent necrotic liver disease in rats. Years later, researchers found that selenium is an essential component of the antioxidant enzyme glutathione peroxidase. Then, they determined that selenium incorporates into proteins to form "selenoproteins."

This knowledge led to the discovery of at least 25 different selenoproteins in the body, more than half of which are believed to play a role in the antioxidant mechanism. Researchers believe that, through this role, selenium affects some body systems it's associated with, such as the immune system and immune responses. Not all selenoproteins involved in the antioxidant mechanism play roles in other systems, however. Regardless of the functions selenium fulfills, horses only require it in small amounts and it has a relatively narrow safety margin.

The selenium content of forages and grains commonly fed to horses depends

on soil selenium content and pH. Thus, it varies geographically. Central Kentucky pastures, and hay grown locally, tend to be low to marginal in selenium. Selenium can be supplemented in an inorganic (e.g., sodium selenite) or organic (e.g., selenium yeast) form. Commercial horse feeds typically include either one of these selenium sources

(it's usually indicated on the feed label), and manufacturers consider that the horse will obtain a portion of his selenium ration from forage. Therefore, it is important to follow the manufacturer's recommended feeding rates.

The current dietary selenium recommendation (listed in the National Research Council's *Nutrient Requirements of Horses*, 2007) is a total of 1 milligram (mg) per day for a mature 500-kilogram (1,100-pound) horse, even those in light exercise. Recommendations increase to 1.25 mg per day for comparably sized lactating broodmares or heavily exercising horses. A maximum tolerable limit of 2 mg Se/kg dry matter (i.e., the entire diet) has been set to account for the narrow safety margin, and U.S. Food and Drug Administration guidelines state 3 mg per day is a safe daily limit for livestock species. Commercial feeds formulated for higher level competition horses often provide a total dietary selenium intake closer to 3 mg per day to maximize the potential antioxidant benefit

UKVDL Offering New Panels

The UKVDL has developed problem-based panels to assist equine practitioners with a focused diagnostic test selection for equine diarrhea cases.

The panels include multiplex PCR tests for viral agents (equine coronavirus and equine rotavirus) and bacterial agents (*Lawsonia intracellularis*, *Salmonella* species, and *Neorickettsia risticii* [which causes Potomac horse fever]).

Available panels include the equine diarrhea viral, equine diarrhea bacterial, and a combined bacterial and viral panel. Panels will be run on Tuesdays and Thursdays and turnaround time is one to two business days.

Fees are as follows:

- Equine diarrhea bacterial panel: \$45 + \$10 accession fee;
- Equine diarrhea viral panel: \$45 + \$10 accession fee; and
- Equine diarrhea combined panel: \$80 + \$10 accession fee. **UK**

>Craig N. Carter, DVM PhD Dipl. ACVPM, DSNAP, director and professor of epidemiology at the UKVDL, provided this information.

Mineral of the Month

that selenium can provide. Research is ongoing in determining the exact nature of these benefits.

Always work with a nutritionist or veterinarian if you're considering adding mineral supplements to your horse's diet. Also, it's important to consider the total dietary content for a mineral like selenium, which could have lethal consequences if oversupplied. **UK**

>Mieke Holder, PhD, is an assistant research professor within UK's Department of Animal and Food Sciences.

Kentucky's Agricultural Economy Improves

Kentucky agricultural cash receipts and net farm income rebounded in the past year from 2016 levels, but are still well below record levels.

Agricultural economists from the UK College of Agriculture, Food and Environment are projecting 2017 farm cash receipts to be \$5.6 billion, a 3.5% increase from 2016 and a modest increase in net farm income from 2016 levels.



UK agricultural economist Will Snell presents during the 2017 Agricultural Economic Outlook.

"Higher crop yields, improved livestock prices, and fairly stable input costs helped Kentucky agriculture and Kentucky farm incomes rebound in 2017," said UK agricultural economist Will Snell, PhD. "For 2018, assuming a normal growing season, Kentucky ag cash receipts are expected to be slightly higher (\$5.7 billion) with modest gains in poultry, horses, and soybeans, offsetting expected losses in tobacco,

UK Celebrates Continued Lloyd's of London Partnership

Lloyd's of London and the UK College of Agriculture, Food and Environment celebrated their long-term partnership of more than 25 years and continued financial support in 2017. Representatives from Lloyd's recently presented a \$50,000 check to UK to continue their support of the international publication *Equine Disease Quarterly* which published its 100th issue in July.

"We are very pleased to be associated with the *Quarterly*, as it is a one-stop source of very valuable information on issues that directly impact horse owners and others associated with horse welfare across the whole spectrum of the racing, breeding and equine industries," said Patrick Talley, U.S. central region director for Lloyd's America. "I am particularly proud of the long-term nature of the support Lloyd's has provided and the continuity and expertise it demonstrates to stakeholders in the equine world."

Equine Disease Quarterly is produced by the UK Department of Veterinary Science and the Maxwell H. Gluck Equine Research Center.

"The College of Agriculture, Food and Environment is grateful to Lloyd's of London for this long-standing and unique support of the veterinary science department in general since 1985, and of the *Equine Disease Quarterly* for more than 25 years," said Dean Nancy Cox, MS, PhD. "Because of Lloyd's support, this publication has achieved iconic status in the international equine industry, and we are so grateful."

The award-winning publication provides timely and authoritative reports on some of the most important issues facing the equine industry. The *Quarterly* reaches more than 14,500 readers in 100 countries. Available in print and online, its articles are regularly reprinted in scientific and lay equine publications worldwide.

Lloyd's *Equine Disease Quarterly* is available to subscribers at no charge. It is co-edited by Cynthia Gaskill, DVM, PhD; Alan Loynachan, DVM, PhD, Dipl. ACVP; and Peter Timoney, MVB, MS, PhD, FRCVS, from the Department of Veterinary Science.

The most recent issue is available online at gluck.ca.uky.edu/sites/gluck.ca.uky.edu/files/edq_oct_2017.pdf. For more information about the Department of Veterinary Science and the Maxwell H. Gluck Equine Research Center, visit vetsci.ca.uky.edu.

Lloyd's of London is a 329-year-old insurance market whose members underwrite risk on a direct and reinsurance basis in more than 200 countries. As a global leader in specialty insurance, Lloyd's remains committed to supporting equine research and providing the insurance coverage essential to horses' health and well-being and the prosperity of equine industries worldwide. **UK**

>Jenny Evans, MFA, is the senior veterinary science marketing and promotion specialist at the UK Gluck Equine Research Center.



Lloyd's of London recently presented UK representatives with a \$50,000 check. Pictured (L to R): Dr. Peter Timoney, Gluck Equine Research Center; Patrick Talley, Lloyd's America; Dr. David Horohov, UK Department of Veterinary Science and Gluck Center; and Bill Wallace, Lloyd's Kentucky.

corn, and cattle."

Kentucky largely following national trends, with U.S. incomes and cash receipts also seeing a slight rebound but still well below record levels.

"The U.S. agricultural economy rebound was primarily in response to a strong export market, which was up 8% in 2017," Snell said. "Any future disruption in trade will likely put additional downward pressure on agriculture

prices in the midst of ample global supplies."

Without a major supply shock, prices for most agricultural commodities will likely remain relatively low in 2018 in response to abundant global grain supplies, growing meat supplies, and potentially a stronger U.S. dollar.

"Despite the slumping farm economy, the overall balance sheet for U.S. agriculture as a whole remains

Agricultural Economy

relatively strong compared to the farm crisis days of the early 1980s," Snell said. "However, available cash flow and working capital for lower-tiered managers and some highly leveraged producers and young farmers remain a concern for bankers, especially if the current economic conditions linger much longer."

Poultry remains Kentucky's No. 1 agricultural commodity, with wholesale broiler prices up from 2016 levels and the industry largely recovered from the economic effects of recent years' avian influenza outbreaks. Poultry

comprised 20% of all 2017 Kentucky agricultural sales, followed by equine, soybeans, cattle, and corn.

The equine market recovered from the global recession and stabilized in 2017. With early indications of strong 2017 yearling and breeding sales, the equine industry is expected to exceed \$1 billion in Kentucky farm receipts and have continued growth into 2018.

For the entire outlook, visit the UK Department of Agricultural Economics website at uky.edu/Ag/AgEcon/pubs/extoutlook17-18.pdf. **UK**

>Katie Pratt is an agricultural communications specialist within the UK College of Agriculture, Food and Environment.



Light snacks and door prizes will be provided, sponsored by McCauley's

Speakers

- Designing a Nutritional Program for Your Pastures
Dr. Chris Teutsch, UK Forage Specialist
- Reseeding for Winning Pastures: Your Morning Line Favorite
Dr. Ray Smith, UK Forage Specialist
- Buttercup, Thistles, Hemlock: Time to Spray is 8 Weeks or Less
Dr. Bill Witt, Professor Emeritus
- Pasture Management: Making It All Fit
Dr. Jimmy Henning, UK Forage Specialist

Meeting organized by county agents from Clark, Bourbon, Fayette, Mercer, Scott and Woodford counties and the UK Equine Pasture and Forage Working Group.

RSVP to your local county agent or Scott County Extension at 502-863-0984 or dl_ces_email@uky.edu



UK Department of Veterinary Science 2018 Equine Diagnostic and Research Seminar Series

UK Veterinary Diagnostic Laboratory Auditorium

1490 Bull Lea Road, Lexington, KY

Feb. 2, 1 – 5 p.m.

7th Annual UK Equine Showcase
Topic: Safety and Horse Welfare
Requires paid reservation

Feb. 3

9th Annual Kentucky Breeders' Short Course
Topic: Equine Reproduction and Horse Management
Requires paid reservation and includes lunch

Feb. 22

Topic: Parasitology
Speaker: Martin Nielsen, DVM, PhD, Dipl. ACVM, University of Kentucky

No seminars in March, April, and May

June 28

Topic: A Matter of Life and Death: Equine Neutrophil Apoptosis in Inflammatory Conditions of the Intestinal Tract
Speaker: Stacy Anderson, DVM, MVSc, PhD, Dipl. ACVS-LA, Lincoln Memorial University

July 26

Topic: Gastric Ulcers
Speaker: Hoyt Cheramie, DVM, MS, Dipl. ACVS, Boehringer Ingelheim Animal Health

Aug. 30

Topic: Fescue Management
Speakers: Karen McDowell, PhD, EMB, and James Matthews, PhD, MS, University of Kentucky

Sept. 27, 4 – 7 p.m.

Mini-Symposium on Neurologic Diseases
Speakers TBD
Requires paid registration and includes dinner

Oct. 25

Topic: Respiratory Management
Speaker: Morgan Hayes, PhD, PE, University of Kentucky

Nov. 15

Topic: Antimicrobial diarrhea with microbiome
Speaker: Carolyn Arnold, DVM, Dipl. ACVS, Texas A&M University

All seminars are from 4 – 5 p.m. unless otherwise noted

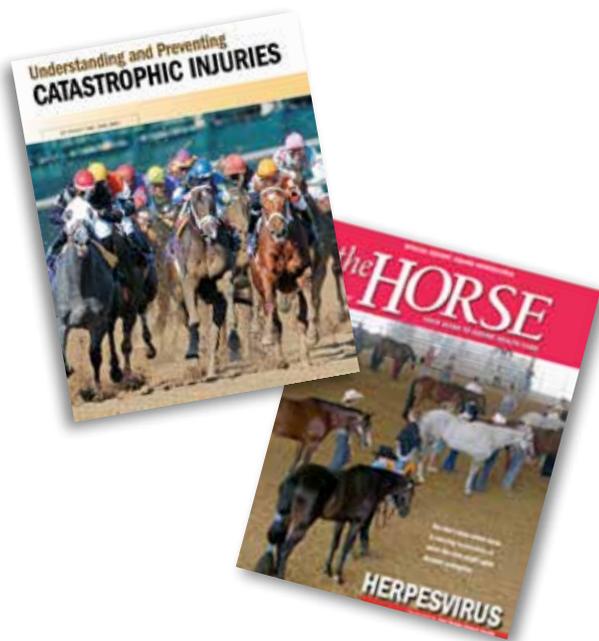
For more information: 859/218-1089 or jenny.evans@uky.edu

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Both Sponsored By Zoetis



Others available at

the HORSE.com
YOUR GUIDE TO EQUINE HEALTH CARE

Upcoming Events

Jan. 19, 2018, 3:30-6:30 p.m.

Dr. Gene Lyons Memorial Reception
UK Hilary J. Boone Center
RSVP by Jan. 16, 2018 at drl Lyons.eventbrite.com.

Feb. 2-3, 2018

UK Equine Showcase and Kentucky Breeders' Short Course
Fayette County Extension Office
Register at 2018ukshowcaseshortcourse.eventbrite.com.

Stay Socially Connected to UK Ag Equine Programs

The UK College of Agriculture, Food and Environment has several equine-related social media pages featuring the latest news and events information.

Follow us on Twitter:

UK Ag Equine Programs:

[@UKAgEquine](https://twitter.com/UKAgEquine)

UK Maxwell H. Gluck Equine Research Center:

[@UKGluckCenter](https://twitter.com/UKGluckCenter)

UK Veterinary Diagnostic Laboratory:

[@UKVDL](https://twitter.com/UKVDL)



Prefer Facebook? Like these pages we administer:

UK Ag Equine Programs: An overarching framework for all things equine at UK, including the undergraduate degree program, equine-related student organizations, equine research and outreach activities.

UK Equine Alumni: A community established for the alumni of UK's equine programs, including ESMA, graduate students and clubs and teams' members.

UK Maxwell H. Gluck Equine Research Center: The mission of the Gluck Center is scientific discovery, education and dissemination of knowledge for the benefit of the health and well-being of horses.

UK Veterinary Diagnostic Laboratory: The mission of the UKVDL is to develop and apply state-of-the-art diagnostic methodology to improve animal health and marketability, to protect the public health and to assist in the preservation of the human-animal bond through the principles of One Health.

UK Horse Pasture Evaluation Program: A service program offered to horse farms in Kentucky with the goal of overall improved pasture management.

Saddle Up SAFELY: A rider safety awareness program sponsored by UK HealthCare, UK College of Agriculture, Food and Environment and many community organizations. It aims to make a great sport safer through education about safe riding and horse handling practices. [UK](#)

UK College of Agriculture,
Food and Environment

SAVE THE DATES

February 2 - 3, 2018

7th Annual UK Equine Showcase

A program highlighting the university's equine programs with an emphasis on safety and horse welfare

9th Annual Kentucky Breeders' Short Course

An in-depth program focusing on equine reproductive issues

For more information and to register visit

<https://2018ukshowcaseshortcourse.eventbrite.com>

